

# The Commercial Car Journal

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## INTERSTATE COMMERCE COMMISSION ORDERS ERIE FERRY CHARGES CANCELED

The Interstate Commerce Commission recently handed down a decision rejecting the proposed increase in the rate of motor trucks and horse-drawn vehicles between New York City and Jersey City, declaring that the rates proposed were unreasonable. The rates would have taxed motor trucks more heavily than horse-drawn vehicles, being based on a basis of weight. The Interstate Commerce Commission claims that it has jurisdiction over interstate ferries as well as interstate railroads, and instructed the railroad to cancel the rates.

## CHICAGO FENDER ORDINANCE FAILS

The corporation counsel has declared Chicago's fender ordinance to be invalid, and a new bill is to be drafted in an endeavor to make it possible for the city to compel commercial cars to be equipped with suitable fenders. For several months past there has been much wrangling over the present ordinance, and charges of bribery in connection with the approval of fenders were made against members of the committee that had to pass upon the efficiency of them. Business interests have declared from the start that it was impossible to make practical fenders without increasing the cost, weight and length of the truck.

## N. A. C. C. WILL CO-OPERATE IN "SAFETY FIRST" MOVEMENT

J. Walter Drake was appointed chairman of a safety first committee which will aid the movement to safeguard workers in automobile factories by the application of protective devices to dangerous machinery and co-operate with safety first organizations seeking to reduce the number of highway accidents. In this safety first campaign the public will be educated in the ways to avoid accidents through talks in public schools and by special articles, etc. Manufacturers will lend moral support to severe prosecution of reckless drivers, and against speeding, cutouts and the useless blowing of horns which frighten people.

## MOTOR TRUCK CLUB OF NEW JERSEY ELECTS OFFICERS

The Motor Truck, of New Jersey, at its annual meeting on December 21st, re-elected David Harper, president, for the ensuing year. The other officers elected were: J. L. Black, vice-president; George Jan-covius, treasurer; Nelson S. Pringle, secretary. George Woodward, retiring secretary, was elected a director, together with J. T. Castle and L. C. Ward.

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## BRISCOE INTERESTS TAKEN OVER BY A \$6,000,000 CONCERN

A corporation capitalized at \$6,000,000 has taken over the Briscoe interests, of Jackson, Mich., including the Briscoe Motor Co., the Argo Co., the Jackson Motor Parts Co., Mason Motor Car Co., Waterloo, Ia., and the Jackson Metal Products Co. and all other interests associated with them. The new corporation has purchased the buildings and machinery of the Lewis Spring & Axle Co., but not the business of that concern, and thirty-five acres of land which will be used by the Briscoe interests in the manufacture of their products. For some time past the Briscoe Co. has felt the need of larger facilities to meet the steadily increasing demand for its product. Benjamin Briscoe is president, and Frank Briscoe, vice-president, in charge of manufacturing operations, while L. E. Willson, formerly of Chicago, but now of Jackson, will superintend the sales and advertising activities of the new concern. A production of thirty thousand cars during its first fiscal year is contemplated, fifteen thousand of which will be the new light "four," and five thousand light delivery wagons. Purchase of the various properties gives the company control of the manufacture of all parts used in its cars.

## NATIONAL GOOD ROADS CONGRESS MEETS IN WORCESTER

The National Good Roads Congress, which met in Worcester, Mass., on December 19th, was pronounced a big success. Lieutenant Governor Cushing opened the meeting on behalf of Massachusetts, and gave a brief review of what that State had done toward building good highways. Many interesting papers were read at the morning and afternoon sessions, and entertainments were held in the evenings. At this four-day convention, one day was set apart as motor car day, when all the topics bore more directly upon motor cars and their traffic on the highways.

## CAPTAIN JOHNSON ADDRESSES S. A. E.

The Metropolitan Section of the S.A.E., at its meeting on December 16th, held at the Automobile Club of America, New York City, was addressed by Captain Johnson, Eleventh Cavalry, U. S. A. He spoke on "What the S.A.E. can do for the American Army." He gave a startling summary of the haulage problem that is involved in any great movement of troops. He also gave an outline of the tonnage movement of materials and the general nature of equipment required for a standard army unit. He suggested that the Section form a committee of engineers to co-operate with a board of officers of the Department of the East in planning a revision of military transport operations, etc. This suggestion will be acted on upon subsequent action of the governing committee.

## MOTOR TRUCK CLUB WANTS GRANITE PAVING

The Motor Truck Club of America has sent a letter to Marcus M. Marks, president of the Borough of Manhattan, city of New York, making a strong plea for granite blocks as a material to be used in the paving of lower Broadway, after the subway excavation is completed. It is claimed that this portion of Broadway is given over almost entirely to commercial haulage, and both horse and motor truck interests agree that the granite blocks would be much better than asphalt.

## TRUCKS KEEP OUT MANUFACTURERS IN EMBARGO

Many manufacturers of Philadelphia, Pa., who have been handicapped by the Pennsylvania Railroads' freight embargo, have been greatly helped by motor trucks. George W. Mink has been running several 5-ton trucks between New York City and Philadelphia as a motor truck express service, the trucks calling at the place of shipment and carrying the goods direct to their destination.

### ELECTRIC STEEL COMPANY FORMED

The Electric Steel Co., Chicago, has been formed and will operate a Snyder electric furnace and confine itself to small castings of superior quality, especially in alloy-steel castings. The officers of the new company are: Charles Piez, president, and P. L. Coonley, secretary-treasurer, who are respectively president and vice-president of the Link-Belt Co., at whose Thirty-ninth Street plant they have operated a Lanzas steel converter for a number of years. The active management of the new company will be in the hands of John M. Olmsted, vice-president, who has been a member of the sales force of Link-Belt Co. These three, with Mr. W. C. Frye and Mr. C. R. Messenger, of Milwaukee, constitute the board of directors. Mr. Frye is the financial head of the Sivyver Steel Casting Co., the Federal Malleable Co., and other successful corporations of Milwaukee, while Mr. Messenger is vice-president and in active control of the Sivyver Steel Casting Co. The successful operation of the Electric Steel Co. from its inception seems assured by the success these men have already attained in parallel lines. That this impression is generally held is proven by the fact that though deliveries of castings will not come until February 15th or the 1st of March, a large proportion of the company's output is already contracted for. A plant has been leased at Thirty-first and Wood Streets, formerly occupied by the Wildman Boiler Works.

### THE DETROIT STEEL PRODUCTS COMPANY'S SPRING DEPARTMENT GREATLY INCREASED

The Detroit Steel Products Co. has enlarged its Automobile Spring Department so that it is now in a position to handle about seven times as much production as it was at the first of 1915. This department of the plant is working on a three-shift schedule, and no man is forced to work all the time at night, the shifts being alternated in such a way that once in every three weeks every man works during the daytime. It was necessary for the company to erect a third building during 1915 to take care of the greatly increased production of automobile springs. Practically every month of the year was a record breaker in this department.

### THE FIRESTONE TIRE & RUBBER COMPANY MAKES THREE APPOINTMENTS

Three district sales managers who will have headquarters at the home office and at the same time work closely with the sales organization in the field have been recently appointed by the Firestone Tire & Rubber Co., Akron, Ohio. Daniel C. Swander, formerly New York City branch manager, has charge of the Eastern district. He is succeeded in New York by C. D. Studebaker. E. W. BeSaw, formerly manager at the Des Moines branch, has been appointed in charge of the Western district. G. A. Spohr succeeds him in Des Moines. N. B. Burwell, of the home office sales department, will take care of the South.

### NEW ERA ENGINEERING STARTS SAVINGS FOR EMPLOYEES

The New Era Engineering Co., Joliet, Ill., has announced a profit-sharing plan for the year 1916. A letter was presented to each one the day before Christmas, stating that the company had opened a savings account of \$5 for those employed with the company for over three months, and \$2.50 for those with the company less than three months. The First National Bank will pay on the savings deposited at the rate of 3 per cent. a year, and the company will add to these savings 2 per cent. In other words, on savings made from the salary of the employee with the company and deposited in the First National Bank during 1916, there will be paid 5 per cent. interest.

### CUP TO BE GIVEN TO SALESMAN MAKING LARGEST MONEY VOLUME OF SALES

E. A. Williams, president of the Garford Motor Truck Co., Lima, Ohio, has presented a cup to be given to the salesman of the R. E. Taylor Corp., Eastern distributors of Garford motor trucks, who makes the largest money volume of sales during the year ending February 1, 1916. Two of the salesmen have each held the cup temporarily during the year thus far. These are A. C. Whitefield of the Manhattan office, and Guy R. Chrysler of the Brooklyn office. They are now engaged in "playing off the tie." Mr. Whitefield at present holds the cup, but Mr. Chrysler hopes to again get it and keep it permanently by the first of February next.

### BOSCH HOLDS ANNUAL DISTRIBUTERS' CONVENTION

The Bosch Magneto Co. held its Annual Distributors' Convention on December 30th, an all-day session being held in the offices of the Advertising Department, 1764 Broadway, New York City.

After a morning session luncheon was served to the delegates; business was resumed after luncheon, and the session continued until 7.00 o'clock. A banquet was served at Reisenweber's immediately afterward, and the party disbanded to meet on Friday for a trip of inspection through the Springfield works. This trip was made in a privately engaged parlor car. Luncheon was served on Friday at the Bosch Casino, Springfield, and dinner Friday night on the dining car en route to New York.

### BELVIDERE SCREW PLANT ERECTING ADDITION

The Belvidere Screw & Machine Co., Belvidere, Ill., in order to meet the growing demand for its products, has decided to erect a new addition, 260x40 ft., running parallel with the present building. When the new addition is completed it is planned to move the spark plug work into the new building. The plating and polishing department will be more than doubled in size and necessary machinery installed, making it possible to double the output of spark plugs without slowing down on any of the other work.

### HURLBURT OPENS NEW PLANT

The new plant of the Hurlburt Motor Truck Co., on the Harlem River and Third Avenue, New York City, has been opened. William B. Hurlburt is head of the company, and associated with him as directors are: Robert B. Roosevelt, New York and Washington; Howard Stout Nielson, Darien, Conn.; William A. Acton, Norwalk, Conn.; Henry W. Gregory, Norwalk, Conn.; A. Anderson, Dickson Q. Brown, Duncan G. Harris, Donald Mackay, Walter S. Wilson, George A. McLaughlin, Kurnal R. Babbitt, Reed G. Haviland, John P. Grier, Merle Middleton and Archibald M. McCrea, all of New York City.

### STUDEBAKER CORPORATION TO SPEND A MILLION DOLLARS

During a three-day convention from December 14th to 16th inclusive, the officials of the company announced plans whereby at least \$1,000,000 would be spent to provide greater production facilities. An immense drop forge plant, double the size of the present one, will be put up, as well as further additions and new buildings.

### WEED CHAIN COMPANY TAKEN OVER BY AMERICAN CHAIN COMPANY

The Weed Chain Tire Grip Co., Bridgeport, Conn., which formed the American Chain Co., Inc., several years ago, has been taken over by the latter concern. A new factory has been erected in Bridgeport, and it was thought advisable to consolidate both the manufacturing and selling organizations into one body. There will be no change in the personnel, management, policies or products of the company, the change simply being in the discontinuance of the name Weed Chain Tire Grip Co.

### STEEL PRODUCTS COMPANY ADDING TO FACTORY

In order to keep pace with the growth of the automobile industry, the Steel Products Co., Cleveland, Ohio, which has been building new units continuously during the past year, is now erecting another addition. This new fireproof building is four story, 126x90 ft. and is built in the L-shape, providing for the addition of another large unit in the near future.

### PACKARD HOLDS TRUCK SALES MANAGERS' CONVENTION

Motor truck sales managers, representing the several principal cities of the East and Middle West, assembled at the Packard Motor Car Co.'s factory in Detroit on December 15th and 16th for a two-day convention, and reported unprecedented prosperity, and indications of the biggest year in the history of the motor truck industry. The meeting was called to introduce to the men the first of a line of light duty trucks the company has ready for shipment. These 1-ton and 1½-ton units are now coming from the factory, and are being delivered to customers as fast as shipping facilities can be provided. They supplement the well-established Packard line of heavy duty trucks.

## Personal Items

**H. A. Neill** has become manager of the Kansas City branch of the General Motors Truck Co., succeeding Estel Scott, who resigned on account of ill health.

**A. F. Mais**, chief engineer of the H. G. Burford Co., Fremont, Ohio, has resigned to accept a similar position with the Morton Truck & Tractor Co., Harrisburg, Pa.

**J. G. Culbertson**, general manager of the Wichita Falls Motor Co., Wichita Falls, Tex., has sailed for London in connection with the foreign business of the company.

**A. C. Harrington**, for thirteen years a member of the Packard forces, has been appointed sales manager of its territory by the Packard Motor Car Co., of New York City.

**George H. Duck**, who joined the forces of the United Motor Truck Co., Grand Rapids, last September, has been appointed general sales, advertising, and factory manager.

**J. G. Cochrane**, formerly Los Angeles branch manager of the Hood Tire & Rubber Co., has been appointed Pacific coast manager of the same company, and has been succeeded by J. J. O'Connor.

**T. N. Gretzer**, formerly advertising manager of the Hart-Parr Co., Charles City, Iowa, has become advertising manager of the B. F. Avery & Sons Co., Louisville, Ky., tractor manufacturers.

**S. W. Schooley**, formerly special factory representative of the Atterbury Motor Car Co., Buffalo, N. Y., has become vice-president and general sales manager of the Kearns Motor Car Co., Beavertown, Pa.

**E. T. Hartje** has sold his interest in the Twentieth Century Garage, Kansas City, Mo., and is now state sales manager for P. J. Downes & Co., agent and distributor for the Jeffery Quad and Jeffery touring cars.

**Harry E. Curtiss**, manager and treasurer of the Boston branch of the Splittorf Electrical Co., of Newark, N. J., has resigned to accept the position of manager and treasurer of the Excelsior General Supplies Co., Chicago.

**W. F. Taylor**, a graduate engineer from Purdue University, and lately associated with the Rose Gear Co., Lafayette, Ind., will hereafter represent the Timken-David Brown Co., Detroit, in a selling and engineering service capacity.

**E. M. Elliott**, of the United Motor Truck Co., Grand Rapids, Mich., sailed for Europe on December 11th to observe United trucks in action both in England and on the continent, with a view to better adapting, if possible, that truck to continental service.

**E. B. Daggett**, formerly Boston branch manager of the Commercial Truck Co. of America, Philadelphia, Pa., succeeds Emlen S. Hare as sales manager of the factory in Philadelphia. Mr. Hare still remains a stockholder and vice-president of the company.

**E. G. Morris** has become manager of the northwestern branch of the McQuay-Norris Mfg. Co., St. Louis, Mo. His headquarters will be in Seattle, Wash., where he will have charge of the states of Washington, Oregon, Idaho, Montana, and British Columbia.

**Jos. C. Regan**, formerly assistant general superintendent of Yale & Towne, Stamford, Conn., has become general factory manager of the Timken-Detroit Axle Co., Detroit. Simultaneously with the coming of Mr. Regan, W. L. Gleason, assistant factory manager, was promoted to the position of assistant to the vice-president in charge of manufacturing.

**W. H. Metcalf**, well-known in Philadelphia automobile industry and secretary of the Motor Truck Association of Philadelphia, has become interested in the sale of Houk wire wheels and has established a salesroom and service station at 328 North Broad Street, Philadelphia, Pa.

**L. T. Petersen**, first vice-president of the Republic Rubber Co., Youngstown, Ohio, has recently been placed in charge of the factory operation, and is assisted by J. M. Cranz, general manager. W. D. Morris is manager of the pneumatic and solid tire departments.

**Chas. S. Dahlquist**, who has been for the last four years chief engineer of the Lippard-Stewart Motor Car Co., Buffalo, N. Y., has become shop superintendent of the Timken-David Brown Co., Detroit, which manufactures the David Brown straight type worm drive for motor trucks.

**A. M. Seennichsen**, one of the founders and general manager of the Auto Parts Mfg. Co., Milwaukee, Wis., has resigned to organize the A. M. S. Co., manufacturer of parts and accessories. Associated with him will be G. W. Brown and T. C. McMillan. A factory is being established.

**W. F. Jolley**, formerly connected with the Troy Wagon Works Co., Troy, N. Y., has purchased an interest in the Miami Automobile Trailer Co., of the same city. He has become manager of the Miami company and will devote his entire time to it. The name of the company has been changed to the Miami Trailer Co.

**W. L. King & Co.**, of Oakland, Cal., has secured the agency for the F. W. D. truck, of the Four Wheel Drive Auto Co., of Clintonville, Wis.

**Baker Motor Sales Co.**, distributors of Selden trucks, has taken over the entire service station of the Knox Motors Associates, located on Green Street, Cambridge, Mass., almost directly in the rear of its present salesrooms.

**Stewart Motor Corp.**, Buffalo, N. Y., elected the following officers: T. R. Lippard, president and general manager; R. G. Stewart, vice-president and chief engineer; R. P. Lentz, secretary and treasurer. The capitalization has been increased from \$250,000 to \$325,000.

**Michigan Hearse & Motor Co.**, Grand Rapids, Mich., has been reorganized with the following officers: Walter Ioor, president, succeeding Alvah W. Brown; Mark Morris, vice-president; A. C. Chapman, secretary and sales manager, and E. W. Aumeal, general manager.

**H. J. Koehler S. G. Co.**, Newark, N. J., recently placed the following agencies:

Stein & Guenther, Reading, Pa.; Wilmington Auto Co., Wilmington, Ohio; Motor Truck Sales Co., Providence, R. I.; C. L. Mains & Co., Minerva, Ky.; Armfield Percival Motor Co., Fayette, N. C.; H. J. Wagner, Hontzdale, Pa.

**The Bessemer Motor Truck Corp.** has been formed to take over all existing agency contracts and to handle the line of Bessemer trucks in Eastern territory, including New England States. New York offices have been opened in Long Beach Building, Lexington Avenue and 42d Street, New York City. Branches are contemplated in other large cities.

**Electric Storage Battery Co.**, Philadelphia, will hereafter conduct its business on the Pacific coast through Geo. R. Murphy, with offices in the Rialto Building, 118 New Montgomery Street, San Francisco. The business was formerly handled on the Pacific coast by Pierson, Roeding & Co., but owing to changes in that organization the business of the Electric Storage Battery Co. will be handled from the new agency.

## Factory News Items

**Frome Mfg. Co.**, Howard's Grove, Sheboygan, Wis., has entered the motor truck industry and will bring out a light delivery car with worm drive, to be known as the Frome.

**Autocar Co.**, Ardmore, Pa., declared a dividend of 5 per cent. payable December 31st to stockholders of record December 29th. This shows the prosperity the company is enjoying, and it is the first dividend paid for several years.

**White Motor Car Co.**, of Cincinnati, Ohio, will move on March 1st to 2346-48 Gilbert Avenue, Walnut Hills, Ohio. The concern will operate under the name of H. W. Fenger & Co. The new building is of fireproof construction, 60x116 ft., and two stories high.

**Globe Furniture Co.**, Northville, Mich., is about to put out a 3½-ton truck. G. E. Porter, formerly connected with the Wilson truck, is engineer, and J. H. Eddy, formerly with the Timken-Detroit Axle Co., will help build the truck and also direct its sales.

**Kansas City Tire & Rubber Corp.**, erecting factory at 4th and Central Streets, Kansas City, Mo., to be finished by March 1st. Machinery will be installed for manufacturing 500 tires a day. P. E. Werner, of Akron, Ohio, and Chicago, is vice-president and general manager.

**Thos. B. Jeffery Co.**, Kenosha, Wis., distributed \$50,000 in gifts among its 3000 employees. All those who were on the pay roll on June 1st received double their usual salary for the week and those who were employed since that time received their usual wages plus 50 per cent.

**Ohio Motor Co.**, Canton, Ohio, a new concern, will erect factory 600x60 ft. One of the specialties to be manufactured is motors for trucks, tractors and aeroplanes. Steps have been taken to incorporate the company with an authorized capitalization of \$500,000, of which \$200,000 will be paid in.

**Santa Maria-Biddle Truck Co.**, 3302 Chestnut Street, Philadelphia, Pa., has been formed for the sale of motor trucks with the following officers: A. H. Santa Maria, president; A. Mercer Biddle, Jr., secretary-treasurer, and J. Craigie Fleming, general manager. The Rush and Selden lines will be handled.

**Doehler Die Casting Co.**, Brooklyn, N. Y., and Toledo, Ohio, is erecting additions to the Toledo factory, which will contain 70,000 sq. ft. of floor space, consisting of foundry, machine shops and offices. These buildings will be ready for occupancy by May 1st and the company will then be in a better position than ever to give its Western patrons prompt and efficient service.

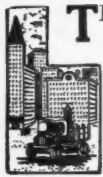
**Federal Motor Truck Co.**, Detroit, distributed bonuses from 5 to 10 per cent. to its employees according to the length of time they have been with the company. Those who have been on the pay roll from 6 to 9 months received 5 per cent. of their salary, and those from 9 months to a year 7½ per cent., and those who have been with the company a year or more received 10 per cent.

**Smith Form-A-Truck Co.**, 115 S. Dearborn Street, Chicago, Ill., maker of the Smith Form-A-Truck attachments for Ford cars, announces that material has been purchased for 40,000 truck units, and a production of 50,000 a year is expected. Samuel D. Porter, formerly connected with the Maxwell, Columbia and Stoddard-Dayton companies, has been appointed general sales manager. Plans are under way for a big selling and advertising campaign.

# Report of the Eleventh Annual Midwinter Meeting of the Society of Automobile Engineers

## New Standards Accepted to be Voted on by Mail. Reports of Tests Throw New Light on Effect of Sulphur in Steel

By E. S. FOLJAMBE



**T**HE eleventh annual meeting of the Society of Automobile Engineers recently held during the New York Show, was undoubtedly the best meeting of its kind which has yet been held during the winter season. Great progress has been made by the Society in respect to standardizing the various parts and equipment of the automobile.

In but a very few years, this Society has established standards for very nearly everything which enters into automobile construction. Not only has it established standards, but these standards are being lived up to by the manufacturers and steel makers throughout the United States. Instead of a chaotic state which existed before the coming of the Society of Automobile Engineers, there is now unity, harmony throughout the industry and universal standards.

This standardization work has gone beyond the limits of our own country. International standards, with a view of trying to bring the manufacturers of Europe and America into closer relationship, are now being undertaken. The matter has been placed before the United States Bureau of Standards, and the Society has the assurance of the support of this Government department.

The Standards Committee met the day before the regular sessions and there was also a joint meeting of the S.A.E. Council with the officers of the various local sections of the society. At this meeting the question of financial aid from the main organization was discussed and \$250 per year settled upon as the amount that each section could receive during the year, if applied for.

A few of the subjects which received special attention and occupied the members at the meeting, were as follows:

Headlight Glare

Battery Ignition vs. Magneto Ignition

Sulphur Content of Steel, etc.

This latter paper, by Dr. Unger, presented some results of tests which more or less startled the members present, as they were diametrically opposed to the accepted belief in regard to the effect of sulphur. The tests made by Dr. Unger may prove the beginning of a wider knowledge of the effect of the sulphur content in steel.

### New Officers Elected

Russell Huff, of Detroit, Consulting Engineer of the Dodge Bros., was elected president of the Society of Automobile Engineers, to succeed William H. Van Dervoort, the retiring president, who is president of the Moline Automobile Co., Moline, Ill. Mr. Huff is well known in the automobile industry, having been for many years prominently connected with the Packard Motor Car Co. First vice-presi-

dent, Eugene S. Foljambe; second vice-president, Robert H. Combs; treasurer, Herbert Chase.

The new members of the Council are Edwin R. Hall, David Beecroft, John G. Utz and George W. Dunham.

### First Professional Session

There were but two days of professional sessions, Wednesday and Thursday, January 5 and 6. The first day's session was opened by A. B. Cumner, treasurer of the Society, who reported \$29,769.92 as the balance in the treasury for the year ending December 31, 1915. After the treasurer's report there was a report of the tellers



RUSSELL HUFF, President of the S. A. E. for 1916

Mr. Huff, the newly elected president of the Society of Automobile Engineers is well known to the industry, having been connected as chief engineer of the Packard Company since 1905. Since November 1st, 1915, he has been chief engineer of the Dodge Brothers, Detroit. He assumes the responsibilities of president after a long series of years of active service as a member of many of the S.A.E. committees. He believes in increasing membership, in having an engineering digest, and has definite ideas in regard to financing of the Society.

of the election, resulting in the above-mentioned officers being elected for 1916.

The report of the membership committee was given by Coker F. Clarkson, showing that practically two hundred new members had been added to the roster. However, as several had been dropped during the past year, the total membership of the Society has remained about stationary, which is but natural after the tremendous increase of the last year.

Under new business Conant, of the Detroit Section, suggested that each section of the Society elect a member of the nominating committee. This was discussed by R. H. Combs and others, and it was finally decided that the matter would have to be taken up according to the by-laws at the

midsummer meeting, and that recommendation as to how the nominating committee should be appointed should be handed in before that meeting.

### Standards Committee Report

The first report was that of the Electrical Equipment Division by Chairman A. L. Riker on Headlight Glare. This subject was separated into the engineering method of eliminating headlight glare as distinct from any suggestion to the law makers as to the methods of controlling it by law. The report of the committee, which was a part of the eighth report of the Electrical Equipment Division, was finally accepted as recommended practice to be voted upon later by letters ballot, as are all of the committee reports after it had been made to read as follows: "The headlight shall be so arranged that no portion of the reflected beam of light when measured 75 ft. or more ahead of the lamp shall rise over 42 in. above the level surface on which the vehicle stands." A part of the same report, regarding wiring specifications, was adopted as presented.

The third report of the Electrical Vehicle Division was then made by Chairman Arthur J. Slade. This was accepted and provides for speed and mileage ratings as follows:

### Speed and Mileage Ratings

Electric vehicle speed ratings shall be based on continuous operation with one-half load over hard, smooth and level roads or pavements at the actual average battery voltage.

Electric vehicle mileage ratings shall be based on a continuous run at the S.A.E. rated speed with one-half load, over hard, smooth and level roads or pavements.

### Report of the Iron and Steel Division Accepted

The report of the Iron and Steel Division, by Chairman K. W. Zimmerschied, was adopted. This dealt with Test Specimens, Sulphur and Phosphorous Limits, Standard Color Scheme, the Elimination of Overlapping Specifications and the Physical Properties of Alloy Steels.

### Lock Washers Division Report Adopted

The next matter to be taken up was the Lock Washers subject, introduced by Chairman C. H. Loutrel. The table on the following page gives the sizes as adopted for a recommended standard.

### Miscellaneous Division's Report

The report of the Miscellaneous Division was given by Chairman J. E. Utz, and covered the subject of License Plates, Tire-pump Bases, Location of Engine Numbers, Location of Chassis Numbers, Standard Weight of Car, Water Hose and Clamp.

The report of the Research Division, by Prof. D. L. Gallup, chairman, was one of

progress only. This covered tap and drill sizes and condition for acceleration tests; also gasoline mileage tests.

### Springs Division Report Adopted

C. W. McKinley not being present, the report was made by Mr. Zimmerschied, covered the Method for Inspecting and Testing Springs, Specifications of Automobile Springs, Tolerance as to Height and Load.

### Truck Standards Division Report Accepted

W. P. Kennedy, chairman of the Trucks Standard Division, handed in his report, which is herewith printed in its entirety, as it is of special interest to truck makers.

### Report of the Truck Standards Division

1. The Truck Standards Division reports three subjects for standardization.

#### Industrial Truck Tires

2. It is recommended that the standard nominal diameters of industrial truck wheels shall be 10, 16, 20, 22 and 27 in. On the data sheet with the wheel diameters shall be printed a footnote indicating the present tire sections recommended by the Association of Railway Electrical Engineers.

#### Solid Tire Diameters

3. It is recommended that the 32 in. diameter be dropped from the standard list of truck wheel diameters. This is done because it is found that commercial cars with wheels as small as 32 in. are almost always fitted with pneumatic tires, and 32-in. tires form a very small percentage of the total output of solid tires.

4. The 34-in. tire is recommended for inclusion in the list of sizes. There has been considerable demand for the inclusion of this size in the S.A.E. standards, and the recent circulation of a document signed by tire and wheel makers has served to draw out comment and results in this recommendation.

5. The data sheet is to be rearranged to indicate that only tires of 34, 36 and 40 in. are S.A.E. standard, although data on the other sizes is to be printed as a guide for tires of other than standard sizes.

#### Felloe Bands for Four-Inch Tires

6. It is recommended that the standard thickness of felloe band for 4-in. solid tires shall be  $\frac{1}{4}$  in. This was the original standard thickness, which was changed to  $\frac{3}{8}$  in. because of demands of some makers. It has been found that the thicker bands have not come into general use, so it is thought best to return to the original thickness.

### PROPOSED STANDARD LOCK WASHERS FOR SMALL MACHINE SCREWS

SCREW			LOCK WASHER				Counter-bores Recommended
No.	Diameters		Inside Dia.	Section			
	Max. Body	Fillister Head		Radial Width	Thick-ness		
					Light	Heavy	
4.112	$\frac{1}{16}$ (.172)		(.114)	$\frac{1}{32}$	$\frac{1}{32}$	$\frac{3}{16}$ (.188)	
6.138	$\frac{7}{32}$ (.219)		$\frac{9}{64}$ (.141)	$\frac{3}{64}$	$\frac{1}{32}$	$\frac{1}{4}$ (.250)	
8.164	$\frac{17}{64}$ (.266)		$\frac{11}{64}$ (.172)	$\frac{3}{64}$	$\frac{1}{32}$	$\frac{9}{32}$ (.281)	
10.190	$\frac{5}{16}$ (.313)		$\frac{13}{64}$ (.203)	$\frac{1}{16}$	$\frac{3}{64}$	$\frac{11}{32}$ (.344)	
12.216	$\frac{11}{32}$ (.344)		$\frac{7}{32}$ (.219)	$\frac{1}{16}$	$\frac{3}{64}$	$\frac{3}{8}$ (.375)	
14.24	$\frac{25}{64}$ (.391)		$\frac{1}{4}$ (.250)	$\frac{3}{64}$	$\frac{1}{16}$	$\frac{7}{16}$ (.438)	

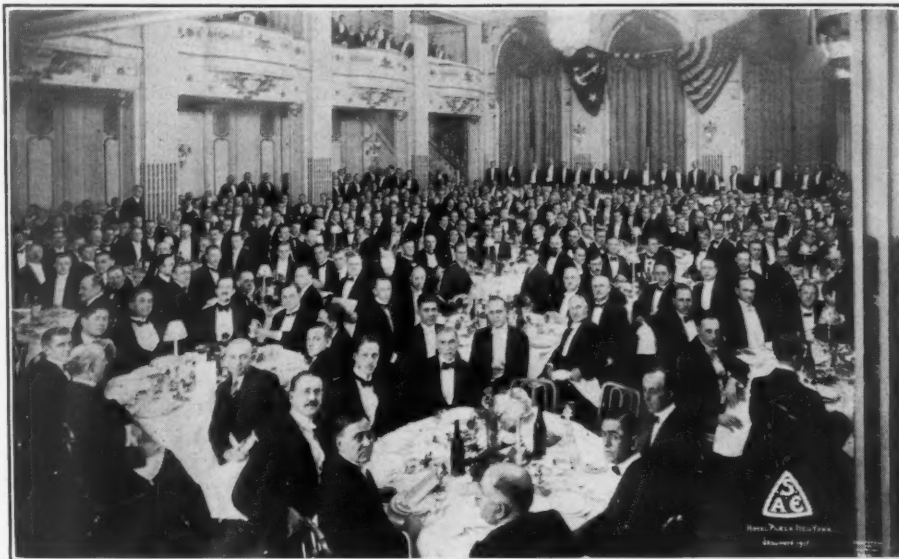
### Professional Session of Thursday

This session was opened by President Van Dervoort's address, in which he outlined very lucidly the work during the past year of the Society, called attention to the Standards Committee work, the moving into new quarters, and dwelt particularly upon the splendid work which was being done in the various Sections of the Society throughout the country.

In connection with Society activities, he spoke very highly of the effect, not only of Section work upon the members, but also upon the manufacturers in the par-

"This society is wielding a national influence of which we should all be enthusiastic. Evidence of this is shown by the recognition which Mr. Daniels, Secretary of the Navy, gives us in asking this society to appoint two of its members on the Naval Advisory Committee.

"Requests from army officials for advice and information on transportation problems, requests from manufacturers for more standards, the demand for copies of our proceedings and our data books from other engineering societies, from college professors, from city libraries, and from prominent engineers in other professions, all indicate the enviable position of importance



Annual Dinner S. A. E., Plaza Hotel, N. Y.

At this notable dinner, the largest yet held by the society, over 520 being present, the Honorable Josephus Daniels, Secretary of the Navy, and Major-General Leonard Wood, U. S. A., Commander of the Department of the East, and Alfred Reeves, General Manager N. A. C. C., addressed the members on "The Automobile Engineer in Our Country's Defensive System."

ticular districts in which the Sections are located.

In speaking of the Summer meeting and the excellent program and the enthusiasm of the large number of members who attended, he said as follows: "So successful was this meeting that following the general policy of the Society, it was practically decided to standardize this type of meeting for our Mid-Summer Outing." He also called attention to the broadness of character of the standardization work, showing that this had reached already across the ocean, and that direct results were likely to follow in the near future in connection with international standards.

In glowing terms he mentioned the co-operation and the splendid work of the general manager, Mr. Coker F. Clarkson, of Chairman Zimmerschied, of the Standards Committee, of the Council, of the Section officers and members of the Society in general.

Retiring president Van Dervoort was followed by President-elect Huff, who, in well chosen words, called the attention of the members, not only to the great honor which he felt had been bestowed upon him, but also to the work of the past president, committees, etc., and to the great work which was being carried on by the Standardization Committee.

He said:

which this society has attained in its few years of existence.

"It is my earnest hope that we can still further increase the sphere of influence of this society. We already have six live sections and one student branch, but I believe there is room for more student branches and possibly more sections. A number of new lines of endeavor closely allied to automobile engineering should receive our attention. I have in mind the good roads movement, aeroplane and motor boat engine development and manufacturing engineering. We also need a comprehensive library and a good engineering digest. I simply cite these few examples out of many new lines of work which this society could take up and work at for the benefit of the industry, to show the many possibilities for growth and influence of which we have not taken advantage."

The first professional paper was then taken up. This was the paper by Dr. J. S. Unger, entitled "An Investigation of the Effects Produced by Varying the Sulphur Content of Basic Open Hearth Steel." This paper, as before mentioned, brought out the fact as far as the tests made by Dr. Unger are concerned, that a much larger percent of sulphur is allowable without detrimental effect than has heretofore been supposed. The extracts of this paper, which are herewith published, give the reader a fairly good idea of the contents of same.

# An Investigation of the Effect Produced by Varying the Sulphur Content of Basic Open-Hearth Steel

Paper Read by DR. J. S. UNGER \*

## Introduction

With the advent of basic open hearth steel the consumer found that from 0.040 to 0.050 per cent. sulphur, or about two-thirds that of the Bessemer, was the usual sulphur content of such steel. Believing that high sulphur always indicated that the steel was bad, he naturally insisted on the lower limit, or below 0.040 per cent. sulphur in his steel.

Sulphur in steel, whether justly or unjustly, is in many cases held responsible for the bad working of steel. As a result the specifications covering the allowable amount of this element have been gradually lowered until in certain cases below 0.030 per cent. is the limit demanded. It is very difficult to reach this limit by the basic open hearth process, and when reached there is a grave doubt in the minds of many whether the quality of the steel has not suffered by the excessive purification required to produce such results.

It became almost the universal practice when steel showed a tendency to work badly or become red short to make an analysis of the steel. If this analysis indicated that the steel had the proper or permissible amounts of the usual elements, but happened to be a few thousandths of a per cent. higher than the permissible amount of sulphur, the sulphur was held responsible for the trouble.

Failures due to poor raw material or improper metallurgical treatment were common. Sulphur was largely blamed for such results, and a strong prejudice against it was established. This belief was handed down from one person to another. Rarely has it been questioned, nor have many efforts been made to establish the truth, until at the present time few are ready to believe that sulphur up to a reasonable amount, say, under 0.100 per cent., does not affect or at the most only slightly influences the working properties during manufacture, or the quality of the finished steel.

## Effect of Low Sulphur on Steel

Some steel making processes have been brought forward which produce a steel lower in sulphur than the basic open-hearth process, but where the author has had an opportunity to compare such steel with open-hearth steel having the same physical properties, no difference could be detected in the surface produced or the hot working properties.

The subject of sulphur in steel has been studied by others. Their results agree in this point: *When other conditions are equal, no marked differences were observed in the working properties or in the quality of the finished material.* Where slight differences were noticed in the working properties, they were corrected by lowering the hot working temperatures of the very high sulphur steels.

\*Manager, Central Research Bureau, Carnegie Steel Company, Duquesne, Pa. Extracts by Editor "Commercial Car Journal."

## Object

The purpose of this investigation was to prepare steels of different degrees of hardness, each containing varying amounts of sulphur, then work these steels into finished products and examine them carefully during the manufacture and after completion for difference in quality.

## Manufacture, Composition and Rolling of the Steels

Three heats of steel of sixty-eight tons each were made. These were low sulphur basic open-hearth steels of soft, medium and moderately hard varieties of approximately 50,000, 70,000 and 90,000 lb. tensile strength, the Carbon contents being 0.09, 0.32 and 0.51 per cent., respectively.

No selection of stock or furnace was made, the furnaces being taken at random. After a discard had been made to eliminate any highly segregated or streaked condition in the steel and the regular waste provided for, about fifty tons of steel were used in the tests carried out.

The sulphur additions were made in the pure powdered form to the ingots during pouring. The aim was to obtain steels that, excepting sulphur, would be alike in manufacture and composition, thus keeping out any variables and furnishing an opportunity to study the effect of sulphur alone.

In this paper I will refer only to such steels as are of particular interest to the automobile industry.

The manganese of the three heats was .43, .62 and .67 per cent., respectively. Attention is called to this point, as large quantities of steel containing from .070 to .120 per cent. sulphur and .75 to 1.00 per cent. manganese are made regularly for consumers who must have a steel especially fitted for rapid drilling, turning or threading purposes. The comparatively high manganese in this screw or nut stock has an appreciable effect on the hot working properties. This was not the case in the low manganese steels studied in this investigation.

The ingots were heated to 1250 degrees C. and then rolled in the regular way, no attempt being made to give the higher sulphurs any preference.

Table I shows the chemical composition of each heat and the sulphur content of each ingot.

Table I—Chemical Analyses and Purposes for Which Steel Was Used

Basic Open Hearth Heat No. 81160  
Chemical Analysis: Carbon, .09; Manganese, .43; Phosphorus, .012; Sulphurs, .031.  
Sulphur Content in Ingots: .030, .031, .050, .060, .090, .116, .140, .160, .180, .250, .254.  
Purposes for Which Used: Rivets, Chains, Sheets, Wire, Tubes and Pipe.  
Basic Open Hearth Heat No. 71163  
Chemical Analysis: Carbon, .32; Manganese, .62; Phosphorus, .014; Sulphur, .032.  
Sulphur Content in Ingots: .032, .068, .108, .146, .190, .230.  
Purposes for Which Used: Drop Forgings, Channels, Plates and Tubes.  
Basic Open Hearth Heat No. 76185  
Chemical Analysis: Carbon, .51; Manganese, .67; Phosphorus, .015; Sulphur, .025.  
Sulphur Content in Ingots: .025, .055, .095, .135, .167, .230.  
Purposes for Which Used: Axles, Drop Forgings, Rails and Wire Rope.

## Hot Working Properties

The rolling properties of these steels are shown in several of the illustrations in this paper, which give a general idea of the rolled finished material.

Six pieces 6 ft. long each of 8-in. channels, of .32 per cent. carbon steel, with the corresponding sulphur of each piece stenciled on channel, were rolled. No tearing or red shortness is noticeable on the thin flanges of the higher sulphurs.

The ability to weld the soft steel of .09 per cent. carbon is shown in ¾-in. machine made chain. Three pieces of each sulphur content were made. The short pieces of three links each were tested to destruction.

The greater average strength of the hand-made chain over the machine made is not due to better workmanship, but to the fact that the lap in the hand-made chain is almost twice as long.

No trouble was experienced in either the hand or machine-made chain until No. 9 or .140 per cent. sulphur was reached, No. 11 of .180 per cent. sulphur acting similarly. It was found that both could be welded perfectly at the regular temperature and did give good results, but that lowering the welding temperature about 100 degrees C. prevented any cracking or crumbling of the steel in welding.

The evidence seems to show that good and bad welds are more a question of heating and workmanship than either high or low sulphur.

The results of the tests to destruction are given in Table II.

Table II—Breaking Load of ¾-in. Chain

Carbon Content	Sulphur Content	Breaking Load—Hand-Made Chain—In Lb.	Breaking Load—Machine-Made Chain—In Lb.
.09	.030	31,480	32,800
		39,630	33,300
.09	.060	40,710	35,630
		41,470	31,600
.09	.090	40,820	23,300
		30,940	24,000
.09	.140	40,710	26,450
		37,690	22,700
.09	.180	32,990	31,650
		40,390	31,200

A number of rivets, ¾ in. diameter by 2 in. long under the head, of the .09 per cent. carbon steel were made and subjected to the various hot and cold tests shown in Fig. 5. To determine if these rivets were of the same strength under shearing stress, ten bars, having two 13/16 in. holes drilled 2 in. from one end, were riveted together by machine at an estimated temperature of 1200 degrees C. These bars were then tested with the results shown in Table III. Practically no difference is observed in the tests.

A number of bars from both the .32 per cent. and .51 per cent. carbon heats of various sulphur contents, 2 in. x 2 in. x 16 ft. long, were rolled and sent to two prominent automobile manufacturers with a request to drop forge them in accordance with their regular practice, into such shapes as would indicate if any difficulties would be encountered in the heating or forging.

The author was present when this work was done. Crankshafts, connecting rods, steering knuckles and other parts were forged. The flash or excess metal forced out between the dies was not always sheared off, it being allowed to adhere to the forging to show any tearing at the thin outside edges.

The appearance of the flash seems to furnish the strongest evidence of the ability of the high sulphur steels to stand severe hot work.

Table III—Shearing Strength of Riveted Joints

Carbon Content	Sulphur Content	Shearing Strength in Lb.
.09	.030	48,900
.09	.060	48,300
.09	.090	48,800
.09	.140	46,700
.09	.180	47,400

### Cold Working Properties

A number of No. 26 gage sheets were rolled, then galvanized and afterwards made up into spouting. In seaming and beading the spouting, no cracks developed on any specimen, while the coating adhered as closely to one sheet as to another. This work bears a close relation to the stamping or drawing of automobile mudguards, hood covers, bodies or other parts.

Another example of a number of milk can bases of .09 per cent. carbon steel of different sulphur contents. These bases were intended for 5-gal. cans, are 11 in. in diameter, and of No. 16 gage sheet. The work done is very severe, being a reverse draw with two operations in the press. No differences were noticed in stamping any of the specimens.

### Heat Treatment

Tensile specimens were machined from the drop forged steering knuckles of .32 per cent. carbon, after they had been subjected to the heat treatment given in Table IV. Similar tests after treatment were made from the 1¼-in. diameter rounds used in drop forging the clutch pilots from the .32 and .51 per cent. carbon steels. The results obtained are given in Table V.

Table IV—Tensile Tests of Heat-Treated Steering Knuckles\*

Carbon Content	Sulphur Content	Elastic Limit, Lb. per Sq. In.	Tensile Strength, Lb. per Sq. In.	Elongation in 2 In., Per Cent.	Reduction of Area, Per Cent.
.32	.032	62,250	83,250	30.0	60.0
.32	.068	49,375	78,375	31.5	62.8
.32	.108	52,750	77,750	30.0	58.0
.32	.146	58,875	77,875	27.0	61.3
.32	.190	51,875	76,875	28.0	53.8
.32	.230	57,250	76,250	29.0	53.8

\*Annealed at 900 deg. C., reheated to 829 deg. C., quenched in water and drawn at 538 deg. C.

### Effect of Sulphur on Machining Quality

Where any machining was done on the finished material, or in preparing test specimens before and after treatment, no material differences were found. The only

Table V—Tensile Tests of Heat-Treated 1¼ In. Rounds Forged from 2 In. by 2 In. Billets

Carbon Content	Sulphur Content	Elastic Limit, Lb. per Sq. In.	Tensile Strength, Lb. per Sq. In.	Elongation in 2 In., Per Cent.	Reduction of Area, Per Cent.
.32	.032	48,650	80,250	30.5	70.1
.32	.068	48,550	75,550	32.8	68.8
.32	.108	46,400	75,800	30.3	68.7
.32	.146	46,700	73,350	31.5	67.3
.32	.190	45,450	71,550	33.3	66.3
.32	.230	45,850	70,100	31.5	65.0
.51	.025	70,400	111,900	20.3	56.8
.51	.055	76,300	120,800	19.7	51.3
.51	.095	73,950	119,400	19.5	51.5
.51	.135	76,800	120,600	18.3	49.2
.51	.167	73,200	111,750	17.5	45.4
.51	.230	66,350	106,550	20.5	44.7

\*Heated to 830 deg. C., held for 20 minutes, quenched in water drawn at 600 deg. C. for 30 minutes.

†Heated to 816 deg. C., held for 20 minutes, quenched in water drawn at 565 deg. C. for 30 minutes.

Table VII—Tensile Tests of Untreated ¾ In. Diameter Rounds

Carbon Content	Sulphur Content	Elastic Limit, Lb. per Sq. In.	Tensile Strength, Lb. per Sq. In.	Elongation in 8 In., Per Cent.	Reduction of Area, Per Cent.
.09	.030	31,360	50,460	30.8	64.2
.09	.060	32,740	50,900	30.2	65.3
.09	.090	30,890	51,400	31.2	62.5
.09	.140	31,600	50,700	32.5	64.2
.09	.180	31,530	50,960	30.7	62.3

Table IX—Tensile Tests of .51 Carbon Untreated Axles \*

Specimen Cut from Edge of Axle					Specimen Cut Half-way from Center of Axle			
Sulphur Content	Elastic Limit, Lb. per Sq. In.	Ultimate Strength, Lb. per Sq. In.	Elongation in 2 In., Per Cent.	Reduction of Area, Per Cent.	Elastic Limit, Lb. per Sq. In.	Tensile Strength, Lb. per Sq. In.	Elongation in 2 In., Per Cent.	Reduction of Area, Per Cent.
.025	44,320	92,160	22.0	34.5	45,390	95,270	20.5	29.4
.055	41,250	91,670	20.5	35.7	41,470	92,460	20.5	34.0
.095	43,220	85,650	22.0	35.8	43,300	84,360	20.5	39.9
.135	35,770	81,330	23.0	35.9	35,260	80,370	23.5	37.8
.167	35,400	80,340	22.0	34.3	39,630	81,760	20.5	33.1
.230	36,930	80,060	22.0	34.6	35,070	77,770	24.0	35.2

\*Axles 4¾ in. diameter at center. Journal 4¼ in. x 8 in.

Table XI—Drop Tests of .51 Carbon Untreated Axles \*

Sulphur Content	Number Blows to Break Axle	Deflection in Inches After Each Blow Axles Turned Over After Every Second Blow						
		1st Blow	2nd Blow	3rd Blow	4th Blow	5th Blow	6th Blow	7th Blow
.025	33	4 5/8	5 7/8	3 1/4	5 1/2	3 1/4	5 5/8	3
.055	29	4 3/8	5 5/8	3 3/8	5 3/8	3 3/8	5 1/2	3 3/8
.095	30	4 1/2	5 7/8	3 3/8	5 3/4	3 3/8	5 1/2	3 3/8
.135	30	4 7/8	6	3 3/8	6	3 3/4	5 7/8	3 3/8
.167	21	4 1/4	5 3/8	3 3/8	5 1/2	3 1/2	5 1/4	3 3/4
.230	14	4 1/8	5 3/8	4	5 3/8	4	5 1/2	5 5/8

\*Axles Rough Turned. Size 4¾ in. diameter at center. Journal 4¼ in. x 8 in. Weight of tup, 2200 lbs. Height of drop, 16 ft.

The CCJ has most readers because it gives most information

Table VIII—Tensile Tests of 8 In. Channels

Carbon Content	Sulphur Content	Elastic Limit, Lb. per Sq. In.	Tensile Strength, Lb. per Sq. In.	Elongation in 8 In., Per Cent.	Reduction of Area, Per Cent.
.32	.032	45,300	71,580	25.5	54.8
.32	.068	45,000	70,060	26.2	54.8
.32	.108	47,110	70,670	24.2	52.9
.32	.146	46,210	70,060	26.2	50.9
.32	.190	48,930	70,060	24.2	48.4
.32	.230	47,250	67,920	24.5	47.9

Table X—Deflection Tests on 8 In. Channels \*

Carbon Content	Sulphur Content	Load to Deflection in Pounds	Permanent Deflection in Inches
.32	.032	22,400	.04
.32	.068	21,900	.04
.32	.108	22,500	.04
.32	.146	22,300	.04
.32	.190	23,200	.04
.32	.230	23,100	.04

\*Deflection tests made on full size 8 in. channels, 11.25 lb. per ft., 48 in. between centers. Load applied at center.

noticeable thing was that the higher sulphur steels of any carbon gave a smoother machined surface than the lower sulphur under the same condition of feed, speed or depth of cut.

### Tensile Tests of the Untreated Steel

Tensile tests of ¾-in. diameter rounds of .09 per cent. carbon, of 8-in. channels of .32 per cent. carbon and of axles of .51 per cent. carbon, all in an untreated condition, are shown in Tables VII, VIII and IX. The results on the soft steel, Table VII, are same. In the medium steel, Table VIII, there is a slight falling off in the physical properties when the sulphur exceeds .100

per cent. The highest carbon, Table IX, giving the results on specimens taken at the edge and half way to center of axles, shows that as the sulphur rises there is a decrease in the ultimate strength, but an increase in the toughness, as shown by the reduction of area.

In addition to the tests mentioned, deflection tests were made on the full size channels and drop tests on the axles. The results of the deflection tests on the channels are shown in Table X and the results of the drop tests on axles in Table XI.

#### Summary

The tables and illustrations in this paper present the actual evidence obtained in investigating steels of different degrees of hardness with varying contents of sulphur. Wherever possible, variables which might affect the results have been avoided. In practically every case finished articles in common everyday use were made. The work was carried out by the ordinary methods practiced, and in such sizes as are manufactured in the mills or shops. A great deal of work covering other lines of manufacture has been done and additional work is either under way or in contemplation. Any person who has access to the necessary facilities should have no difficulty in duplicating the work done.

The results presented speak for themselves and need very little comment. The author does not advocate paying no attention whatever to sulphur content of steel, but believes firmly that **a steel containing less than .100 per cent. is not necessarily bad**, and that it will show little, if any, difference in quality when compared with the same steel of much lower sulphur, other conditions being the same.

#### ELECTRIC BULBS FOR AUTOMOBILES

By HENRY SCHROEDER

This paper was unusually interesting, and showed not only the present types, but the method of manufacture employed throughout the country. It was well illustrated by lantern slides. He emphasized that voltage variation has a very great effect on the life of the filament, also that bulbs should be rated by amperes, not by candlepower.

During the discussion which followed, McMurtry called attention to several points in connection with the subject, as follows: That the form of distribution curve of the light taken at 120 degrees from the lamp tip is dependent upon the shape of the filament, and showed blue prints illustrating this. He read some matter pertaining to tests on bulbs, and showed that some form of standard lamp rating is necessary, also that some form of standardization of the filament should be undertaken by the Society. He stated that the efficiency of light restricting devices depends on the area of the filament.

Mr. Cook called attention to the fact that the reflected light of the lamp follows the law of inverse squares, and that a slight variation of the setting of the concentrated filament in the lamp makes a very big variation in the result.

At the close of the morning session the members enjoyed a stand-up luncheon in the building, and again assembled for the afternoon session at 2.00 p.m.

#### NOTES ON BATTERY IGNITION

By ALEXANDER CHURCHWARD

In this paper he takes up the various methods of wiring and blamed the car manufacturers themselves for some of the ignition apparatus that was not entirely satisfactory, especially in regard to current consumption. He said:

"They demand an ignition outfit for so much money, usually setting the price. There is only one way to meet this condition, that is, to reduce the amount of material and take a large amount of current. Every manufacturer of this class of apparatus will agree with me when I state that the make-and-break mechanism will last longer and give better satisfaction if the current be held down to a relatively small amount, and the tendency of the coil to burn up will be reduced if the ignition is not turned off when the car is stopped."

A large number of oscillograph tests have been made and were shown in line drawings in his paper. Some very unusual photographs were reproduced of sparks which were made at the Massachusetts Institute of Technology by a Micro-Photometric Camera. These photographs showed the sparks generated by a non-automatic advance system from 400 to 2000 r.p.m., and special attention was called to the difference in intensity of the magneto ignition at these speeds.

The next paper taken up was that of Battery vs. Magneto Ignition, by Frank Conrad, Electrical Engineer of the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. Mr. Conrad, in his paper, gave a brief history of the development of ignition. In this he showed how the magnetically-operated vibrator was finally abandoned and a mechanically operated one substituted for it. He said:

"This, of course, gave but one spark in the cylinder, instead of the series of sparks, induced by the vibrating coil, but as it is necessary to obtain proper timing of the explosion, that the first spark ignites the mixture, the succeeding sparks are superfluous, although it is possible that should the first spark, owing to unfavorable conditions, fail to ignite the explosive mixture, a succeeding spark may do so."

He further stated, in effect, that the advent of electric lighting and later of electric starting had resulted in the use of a more efficient type of generator, storage battery being used when the engine is not running. He seemed to feel that the fact that the modern automobile had a supply of electrical energy much greater than required for simple ignition was sufficient to render superfluous the use of a separate generator for the ignition system. The inherent disadvantage of the vibrating system, that is, the lag or time which elapses between the closing of the primary circuit and the production of the spark at the plug, in his estimation, is what had prevented it from now coming into use; also the fact that the vibrating contact mechanism is limited in the amount of energy it can deliver to the spark plug. Therefore, he said, as this time is constant and independent of engine speed, it is obvious that the spark would occur progressively later as the engine speed increased. To overcome these defects he recommends a design in which the primary contact points are operated mechanically, the same as in the case of the magneto.

In speaking of the limitations of the magneto, he mentioned, the possible secondary voltage it is practical to generate with the magneto equipment, especially at the lower engine speeds.

In closing, he stated:

"That the ignition system in which the primary source of electrical energy is the generator, which can supply in common all electrical demands of the automobile, is the most rational solution, is evidenced by a study of changes in the types of equipment used within the last few years."

#### Magneto vs. Battery Ignition

The next paper was "Magneto vs. Battery Ignition," by Francis R. Hoyt. Mr. Hoyt seemed to feel that his paper had been unnecessarily curtailed and changes made in it which should not have been made by those editing the paper. He, therefore, read his original manuscript. This matter was mentioned by the chairman, and it was shown that the paper was not in the hands of the committee in sufficient time to have it returned to Mr. Hoyt for his approval, but that it would be gone over before final publication.

This paper, which was very complete, classified circuits into two divisions; one he called the "Open Circuit Battery System." In this, the contact breaker is normally open and the necessary periodic closing is accomplished by some mechanical device for a definite interval of time regardless of the speed of rotation. The other division consists of those battery systems in which a normally closed contact breaker is opened periodically by a revolving cam or its equivalent.

An interesting feature of the paper was the diagramming of the current wave of open circuit battery systems and also of closed circuit battery systems. He also diagrammed the secondary current wave of the high tension magneto. Indicator diagrams were also shown taken from battery and magneto ignited engines.

Curves were also shown giving the economy and horsepower of magneto and battery systems, and the effect of spark advance in open circuit battery systems was given in tabular form. In his conclusion he showed illustrations to represent the spark heat of ignition of the various types. The following are the conclusions which he draws:

#### Conclusions

"The electrical principle upon which an ignition device is constructed determines its possible performance.

"The rate of flame propagation of a combustible mixture depends upon its quality, the compression and the speed of the engine.

"For the best results the spark in an engine cylinder must occur at a time depending on the rate of flame propagation.

"Spark advance while unnecessary is often (though inefficiently) used as a substitute for spark heat.

"The unavoidable errors nearly always present in spark-timing can be compensated for to a great extent by increasing the spark heat.

"A spark of constant heat value and short duration (open-circuit battery system) must rely entirely on spark advance for meeting varying engine conditions.

"A spark can occur too early even though from outward appearance the engine is operating correctly.

"A spark that grows weaker (closed-circuit battery system) as the engine speed increases is wrong in theory and practice.

"The larger the spark the faster the flame-spread and the greater the efficiency.

"A prolonged or 'follow-up' spark in any advanced position is necessary because of the constant change in the position of the gas vapor with respect to the spark-plug gap.

"A spark that increases in intensity as the speed increases and burns in the form of an arc for a measurable period after its first passage (high-tension magneto) conforms directly to the requirements of an engine."

### Electric Lighting and Starting

Electric Lighting and Starting, by Joseph Bijur was one of the longest papers presented. It took up in detail the elementary principles of electric lighting and starting and then discussed the various systems now employed. In connection with the use of Tungsten bulbs for lighting, he brought out the point that it is desirable to have the wires which feed the bulbs connected electrically, close to the terminals of the storage battery, rather than to some point between the generator and the battery, because the voltage at the battery terminals varies less than the voltage at the generator terminals, or at any place between. This was mentioned on account of the danger of spoiling the bulb by an increase in voltage.

The subject of multipolar units was discussed at considerable length, as was also the regulation of generators. The factors governing size and speed were discussed at length, and also the fact that the cut-in speed was not important, but is often set or determined as the speed at which the generator gives a voltage equal to that of a fully charged floating battery, or about 7 volts. As the resistance of the armature does not come into play because no current is being carried, it is possible to get a low cut-in point by disregarding armature reaction and armature resistance and simply wind the generator armature with many turns of fine wire.

### Cold-Weather Cranking Torque

Factors effecting the minimum size of generator are the permissible heating and the permissible sparking at the brushes. The paper went into the details of starting motors and of the characteristics of starting motors. These were shown by curves. He assumed that the cranking torque required in very cold weather might be taken as four times that needed for ordinary services. In reviewing the curves, he states "it may be noted that in most cases until the size of the motor is forced down to the smallest possible, the locked torque is usually not the limiting factor, if the condition for cranking a cold motor at adequate speed has been met."

"It is characteristic of single-unit systems that for cranking they usually develop a lower locked torque on the crankshaft as compared with the same weight of apparatus arranged in the two-unit system. For equal weights, the single-unit system while somewhat deficient in the locked torque, is also somewhat lacking in ability to crank a cold motor around 60 revolutions, but the difference between the single-unit and two-unit systems is not as great as generally supposed.

"It is characteristic of the single-unit system, operating with constant engine ratio and with only one armature winding, that it is most efficiently operated at 12 volts; whereas the two-unit system is perfectly satisfactory at 6 volts. A large part of this difference is due to the characteristics of the brushes required for good operation as a generator, which must also serve as motor brushes when the machine is cranking; whereas with the two-unit system the motor can be designed without any reference to the generator, and thus adequate provision made to keep the losses small on a 6-volt system."

### Discussion in Brief

In the discussion which followed these three papers, and there was some discussion, Mr. Conrad explained that the magneto spark was not hotter at high speed, but only apparently so, due to there being a number of sparks, but each individual spark was really not hotter than at lower speeds.

W. G. Wall, in his remarks, called attention to the fact that the apparently better results from magneto ignition in engine tests which they had made, perhaps were not due so much to the supposed automatic advance of the magneto as to what Mr. Hoyt brings out in paragraph on page 10, namely, the arc flame, or following up of the current.

In comparing the two systems, he called attention to the fact that the magneto is a self-contained unit, while the battery system is usually made up of several units, which are, to a certain extent, separated, and that these features had really more to do with choice of systems, together with the lower cost of the battery, than did the efficiency or the heat of the spark, etc.

Louis E. Rhoades suggested, as a method of distinguishing the open and closed circuit type, the method whether cam closed or spring closed. He said that on the eight and twelve cylinder engines, the closed circuit practically becomes an open circuit; therefore, there should be some method of distinguishing them.

Harold H. Brown suggested cam and spring-brake as the name, and that the time of contact should be independent of the speed of the engine.

R. H. Combs took exception to Mr. Wall's remarks on trouble with the battery system, due to it being spread out over the car and incidentally took a knock at the designers, because they do place these various parts so widely separated on the chassis.

A. D. T. Libby soundly rated certain battery people because on some car, which he had investigated, there was marked on the switch "Magneto," and the owner of that car thought that he had a magneto on it. He also called attention to the fact that the magneto secondary does not require as many turns as the battery, and, therefore, not as much insulation.

Mr. Hoyt, in answering some of the arguments, claimed that it was perfectly possible to build a magneto to give a hotter spark at high speed if desired. He claims that the flame spark is equivalent in action, under unfavorable conditions in the engine, to the series of sparks given by the vibrator coil.

Herbert Chase questioned Mr. Hoyt's conclusion that the rate of flame propaga-

tion of a combustible mixture is at all dependent upon the speed of the engine, as stated in his second conclusion. He also questioned the third from the last, namely, that the larger the spark, the faster the flame spread and the greater the efficiency.

Another speaker called attention to the fact that there was nothing in the contention that a cold battery would not ignite the engine, saying that if the battery were able to crank the engine, it would be amply able to ignite it.

Russell Huff spoke of the large flame of the magneto as being an advantage when the mixture is weak or not right. If the mixture is absolutely correct, one form of ignition is about as good as the other. He also said that the lack of advance ability of the magneto was perhaps responsible for the fact, as noted by him, that the battery-ignited engine pulls away from the magneto one at high speeds.

Mr. Kittering called attention to a feature which had apparently been overlooked, that the problem of to-day is not ignition on four cylinder engines at 1400 r.p.m., but ignition on eight and twelve cylinder engines at 3000 r.p.m. He would like to see a committee test out this matter. He further stated that the automatic spark advance was impossible, unless built to meet the power curve of the particular engine, and that the spark advance mentioned in the paper as twenty-seven degrees at 3000 r.p.m. is about what is required. This closed the session and one of the best discussions which was held during the meeting.

### ACCESSORY JOBBERS' ASSOCIATION ACTIVE

The National Association of Automobile Accessory Jobbers, although less than a year old is already exerting an immense influence in the trade. At its Convention January 7th to 11th, the membership reached almost 275, and the most notable feature of the Convention was the fact that price cutting and irregular practices generally, of which jobbers are usually accused, were severely condemned and the membership of the association is to be kept free from concerns which are guilty of such practices.

Of special interest to the Commercial Car Journal's readers was the resolution adopted regarding the sale of accessories at wholesale to commercial car users, to the effect that no uniform policy would be followed but each jobber was recommended to decide for himself as to local conditions and the effect of such sales on his local trade.

The next Convention of the Accessory Jobbers' Association will be held at Hot Springs, Va., May 9 to 12, 1916.

Hyatt Roller Bearing Co., owing to the rapid expansion of its nation wide service plan, has made a number of additions to the personnel of the various service branches. L. R. Remington, formerly in charge of the service branch in Atlanta, Ga., has been made service manager at Chicago, succeeding J. R. Phillips. R. B. Campbell, formerly at the Detroit branch, has gone to Atlanta, Ga., and J. H. Taylor, a new man, has been placed at the Detroit branch.

### N. Y. SECTION E. V. A. DISCUSS EUROPEAN CONDITIONS

Mr. E. W. Curtis, Jr., of the General Vehicle Co., recently returned from London, England, gave a very interesting talk on "Electric Vehicle Conditions in Europe" at the meeting of the New York Section of the Electric Vehicle Association, held on December 28th.

At the same meeting, Mr. S. C. Harris, storage battery expert of the New York Edison Co., read a paper on "Methods of Design and Operation which Assure Efficiency of the Electric Vehicle," advancing many new and novel ideas based on practical experience and thorough study of the electric vehicle problem. This paper brought considerable discussion from many prominent engineers and proprietors of electric vehicles.

A special feature connected with the meeting of the association was the exhibition of one of the electric taxicabs of the Detroit Taxicab Co. It was stated that twenty-five of the cabs have been in operation in Detroit for over a year with great satisfaction to the Taxicab Co., formerly large operators of the gasoline type, and that the Detroit public was keenly interested in the new development. Several engineers present, in close touch with the taxicab situation, predicted their general introduction in the larger cities of the country.

### THE BIMEL SPOKE AND WHEEL COMPANY MOVES INTO NEW ADDITIONS

The Bimel Spoke & Auto Wheel Co., Portland, Ind., maker of automobile, heavy truck and trailer artillery wheels, has moved into a new addition which will practically double its output for the coming season. Over \$2500 has been expended in this and in making the shops separate. The heavy wheels will now be made in one shop and the light ones in a special shop, thus permitting a much larger production of both lines. The business last year was 282 per cent. larger than in any previous year.

### WEIDELY MOTOR COMPANY CHANGES NAME

Weidely Motor Co., Indianapolis, Ind., has increased its capital from \$100,000 to \$350,000, and has changed its name to the Weidely Motors Co.

The officers for the ensuing year are: W. E. Showers, president; G. A. Weidely, vice-president and general manager; W. A. Umphrey, secretary-treasurer. These officers, with Edmund Rosenberg and L. A. Coleman, make up the directorate.

### PACKARD MOTOR CAR COMPANY, OF PHILADELPHIA, A DIRECT FACTORY BRANCH

In an article by Mr. Spencer in the December issue of the COMMERCIAL CAR JOURNAL, a statement was made on page 14 that the Packard Motor Car Co., of Philadelphia, is a separate company from the parent. Mr. Lee J. Eastman, general manager of the company, informs us that Mr. Spencer is not correct; that his company is a direct branch of the Packard Motor Car Co. of Detroit, Mich.

### RECOGNITION OF CARRANZA GOVERNMENT CAUSES GUAYULE RUBBER INDUSTRY TO BOOM

Immediately following the recognition by the United States Government of Carranza and his de facto government in Mexico, American representatives of a number of large syndicates flocked to that country to purchase leases on guayule producing land. These leases cover only the guayule shrub and do not interfere in any manner with other uses to which the owners of the land may want to put it. The guayule producing region is confined practically to the highlands of the states of Coalhuila, Durango, Zacatecas and Nuevo Leon. If these indications count for much, the guayule rubber industry is on the verge of the greatest boom in its history.

### FOSTORIA LIGHT CAR TAKES OVER STORM BUGGY COMPANY

The Fostoria Light Car Co., Fostoria, Ohio, has taken over the holdings of the Fostoria Storm Buggy Co., capitalized at \$100,000. The Light Car Co. will occupy the entire two-story building on Poplar street, which has been occupied jointly by the two companies. The Light Car Co. is capitalized at \$500,000, with the following officers: J. H. Jones, president; Ira Cadwallader, vice-president; Charles Ash, secretary-treasurer; R. J. Ridgway, general manager; A. O. George, factory manager; M. H. Ayer, general sales manager, and A. R. Morgan, advertising manager.

### FIRESTONE GETS INJUNCTION AGAINST RAIN COAT COMPANY

The Firestone Tire & Rubber Co., Akron, Ohio, has been granted a perpetual injunction against the Firestone Rain Coat Co. by Judge Vickey, in the Court of Common Pleas, Cuyahoga County, Ohio, restraining that company from using the name Firestone in connection with its business and from in any form or manner advertising, manufacturing or selling any rubber goods or any other article purporting to be made wholly or in part of rubber. The Firestone Rain Coat Co. has been operating stores in Cleveland, Indianapolis and Detroit.

Chase Motor Truck Co. has leased floor in the building at 239 W. 40th Street, New York City.

### STUDEBAKER BRANCH MANAGERS' CONVENTION

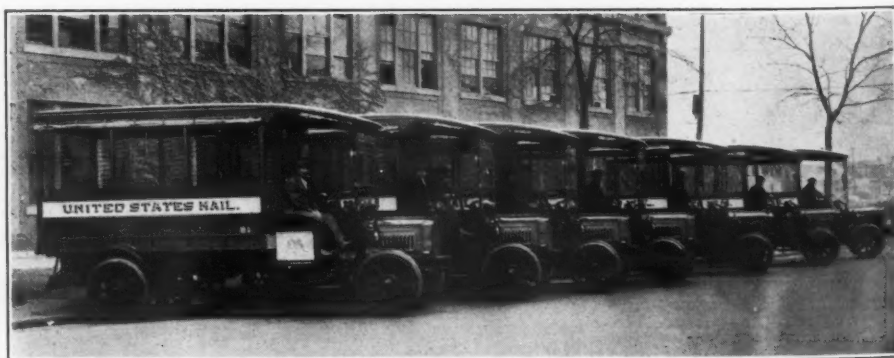
Branch managers met in convention December 14th to 16th at the Detroit factory, and discussed conditions in their respective territories and prospects for the coming year. The reports were all optimistic, and the managers, without exception, asked for increased allotments over last year's shipments. They were told that the dealers were not to face a shortage of cars during the coming season because arrangements had been made to insure deliveries. Addresses were made by E. R. Erskine, president; L. J. Ollier, vice-president, in charge of sales; J. G. Heaslet, vice-president, in charge of manufacturing; C. C. Hanch, treasurer; R. T. Hodgkins, general sales manager; G. L. Willman, W. T. Bush, assistant general sales managers; H. T. Myers, manager of the commercial car department; H. A. Biggs, advertising counsel; H. E. Dalton, W. Robbins, F. B. Amos, W. C. Shanafelt, T. E. McMeans, P. L. Ewell and A. H. Remsen.

### PACKARDS FOR PARCEL POST

In more ways than one the United States Government is applying modern efficiency methods in its business. The record made by gasoline motor trucks under the severe conditions imposed by the parcel post has furnished striking evidence of their possibilities for government work.

The postoffice department has taken the lead in the matter of installing up-to-date hauling equipment. It is understood that large purchases of motor trucks are under way and that the early deliveries are going to local postmasters, who take the initiative in insisting upon more efficient methods of transportation.

A fleet of seven new type Packard motor trucks was placed in service recently at the Detroit postoffice. These vehicles are fitted with regulation screen-side mail bodies and are painted in the national colors as prescribed by the postoffice department. While designed primarily to carry bulk mail, they have interior seats which can be utilized for transporting letter carriers. These new trucks have a capacity of 1½ tons each and are up to the minute in design.



**Detroit's New Parcel-Post Packards**

This shows the fleet recently installed by the Detroit post office. The cars are designed primarily to carry bulk mail, but may also be used for carrying postmen

The CCJ brings greatest returns to advertisers because of largest circulation among quantity buyers

# THE COMMERCIAL CAR JOURNAL

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## MERCHANTS' CHRISTMAS ADVERTISING SHOWS THEIR APPRECIATION OF THE DELIVERY VALUE OF TRUCKS



**D**URING the recent Christmas season, the advertisements of the various merchants throughout the United States show more conclusively than could any amount of salesman's talk the value of the motor truck in modern delivery service. The large department stores, such as John Wanamaker, Marshall Field & Co., of Chicago, and many others, included in their advertisement, matter pertaining to their special delivery by trucks, during the rush season.

In these advertisements, it was pointed out that delivery would be made promptly and on time and also that goods would be delivered the same day; that they would reach the suburban sections after the closing hour; that the delivery trucks of one store, for instance, would travel ten thousand and more miles in delivering Christmas goods, etc.

Other companies had signs upon the sides of their trucks to the effect that these trucks were going to deliver the Christmas goods, and, therefore, the people might expect prompt service regardless of the weather.

The CCJ has most readers because it gives most information

Other firms called attention to the fact that they had increased the number of trucks in their delivery service, and, therefore, prompt receipt of goods could be assured to their patrons.

In many ways, the advertising of the various firms, now using motor trucks in large numbers, indicated a reliance on the part of those firms on the ability of their motor delivery equipment to handle the goods and handle them better than they had ever been able to do it before. This fact was, is, and will be used throughout the winter as a lever for increasing business, and should be an indication to those merchants, who have not yet purchased trucks, that they are losing something which is worth while, and that by using these modern delivery vehicles, they can increase the efficiency of their delivery service, and thereby increase their business.

## THE GROWING SENTIMENT IN FAVOR OF A COMMERCIAL CAR SHOW



**A**LTHOUGH the automobile shows, as far as trucks are concerned, were discontinued some years ago, there has always been connected, with the trade, a large number who believed that some form of national exhibit should be held.

In this publication, we advocated the show in the form of not merely an exhibit of lifeless vehicles within a building, but in addition to such an exhibit, an outdoor show, where demonstrations of all types of dumping bodies, special bodies for handling peculiar or difficult material etc., could be actually operated before the business men and the agents assembled. A track, sand stretches, mud holes, etc., and an incline, giving the maximum grade desired, and many other devices would add considerable interest to the outdoor features of such a show. This, naturally, would have to be held during a season of good weather, perhaps in the fall.

The building, which is now nearing completion in Detroit, and known as the Merchants' & Manufacturers' Building, is pointed out by many as being a suitable place for a truck show. Talk in Detroit, concerning this building, and the fact that Detroit is the center of the industry, is doubtless responsible for the growing sentiment in regard to a national truck show.

That there is a feeling on the part of the truck industry that a get-together of some kind is necessary has been shown by two well-known and well-attended gatherings of truck men in Detroit during the past three years. Both of these were held at Detroit. At these meetings, attempts were made to correct the method of giving service in connection with the sale of trucks and many other things were talked of and improvements suggested in regard to the manufacture and sale of trucks. At a national show, the dealers and users could get together and talk over these matters.

Undoubtedly, the industry to-day is in a stronger financial condition than it has ever been since its inception. This means, in all probability, that in the near future the subject of a national show for trucks will again be revived.

When this time arrives we feel that such a show should not be conducted along the lines of the pleasure car shows, but should be a combination of indoor and outdoor exhibits, particularly the latter, where live demonstrations could be made and where dealers could see in operation and under varying conditions the vehicles in which they are most interested.

# Steel and Rubber Markets

## STEEL PRICES CONTINUE TO RISE

With the unprecedented demand for steel products for export and domestic use, the mills are working to full capacity. Domestic buying opened the year on a good scale and mills are finding inquiries from domestic sources rapidly absorbing that portion of capacity reserved for home requirements. During the week preceding the date of this writing, January 11th, negotiations for placing of orders for fully 600,000 tons of steel for delivery during the last half of this year were started in earnest. Quotations on January 11th were:

### STEEL PRODUCTS PRICES

Bessemer billets, per ton, mill	33 00 a 34 00
Open hearth, per ton, mill	34 00 a 35 00
Sheet bars, per ton	35 00 a
Forging billets, per ton, mill	50 00 a 55 00

The above prices are at tidewater, in carload and larger lots. For quantities less than 2000 lbs. but not under 1000 lbs., \$2 per ton additional is charged, and less than 1000 lbs., \$8 per ton additional.

### SHEETS

The following prices are for 100-bundle lots and over f. o. b. mill; smaller lots are \$2 per ton higher:

Blue annealed sheets—		Cents per lb.	
Nos. 11 and 12	2.30 a	Nos. 13 and 14	2.30 a
Nos. 13 and 14	2.35 a	Nos. 15 and 16	2.35 a
Nos. 15 and 16	2.45 a	Galvanized sheets of black sheet gage—	
Box annealed sheets, cold rolled—		Cents per lb.	
Nos. 10 and 11	2.25 a	No. 12	3.75 a
No. 12	2.25 a	Nos. 13 and 14	3.85 a
		Nos. 15 and 16	3.95 a

### IRON AND STEEL AT PITTSBURGH

Bessemer iron, Valley furnace	21 95 a 22 45
Bessemer steel, f. o. b. Pittsburgh	33 00 a 34 00

## UNITED STATES TIRE CONVENTION

A four-day convention of officials, branch managers and salesmen was held in Detroit from December 14th to 17th, at which over four hundred were present. The sessions were held in the convention hall of Morgan & Wright, a subsidiary of the company. At the opening meeting James Newton Gunn, the new president, met and greeted the men for the first time. Other addresses were made by J. C. Weston, E. S. Williams, O. S. Tweedy, F. I. Reynolds, C. B. Whittelsey, Homer E. Sawyer, C. C. Case, Geo. H. Mayo and J. B. Grady. Dr. W. S. Sadler, of Chicago, spoke on physical efficiency at a dinner at the Hotel Statler in the evening. On Wednesday Mr. McMahon, factory manager of Morgan & Wright, gave an address on "How Tires are Made," which was followed by general discussions, and an address by Genre B. VanCleve on "Advertising M. S. Tires." There were several short talks by branch managers and an address by Ralph W. Ashcroft, advertising manager of the Canadian Consolidated Rubber Co. In the evening there was a dinner at the Hotel Pontchartrain, followed by addresses by Professor Paul H. Mystrom and Thornton Newsum. On Thursday there were a number of interesting talks, a conference of branch managers, and a trip through the factory by salesmen who had never had the opportunity before. In the evening there was a dinner at the Detroit Athletic Club, followed by an address by Hugh Chalmers, on "Salesmanship." On Friday an interesting address was made by G. F. Fisher, of the general laboratories of the U. S. Rubber Co., and a sales talk by F. I. Reynolds, followed by other addresses. The final ses-

sion was a banquet and entertainment without speeches. A daily paper, "The United States Tire Journal," brought out the news of the convention.

## PATENT PLANS PERFECTED BY N. A. C. C.

The National Automobile Chamber of Commerce, which has been working on a plan whereby manufacturers would cross-license their patent rights, announced that this plan has become effective through the joining in of seventy-nine companies. The verified patents of these manufacturers number over three hundred and fifty, and it is expected that when all are recorded there will be over five hundred, covering various details of motor cars.

Under this plan makers license one another under the patents which they control, all with a view to avoiding litigation on the minor forms of improvements in motor car construction which have developed with the business, but which are in no way fundamental. The result is expected to tend toward further improvements and increased values in cars to the ultimate benefit of the retail buyer.

It has long been felt that the legitimate profit in the automobile business came from scientific manufacturing and selling of cars, and not from the exploitation of minor patents which represent only incidental development of motor cars for which engineers are generally responsible, whether they take out patents or not. Manufacturing companies are left free to display their originality along the line of design patents, while, of course, basic patents or those of a fundamental nature do not come within the operation of the agreement.

The CCJ has most advertisers because it gives them biggest returns

Skelp, grooved steel	1 80 a	.....
Sheared steel skelp	1 90 a	.....
Skelp, grooved iron	2 10 a	2 15
Sheared iron skelp	2 20 a	2 25
Ferro-manganese (80 per cent.), seaboard	110 00 a	135 00
Steel, melting scrap	17 50 a	18 00
Steel bars	2 25 a	2 50
Black sheets, 28-gage	2 60 a	2 85
Galvanized sheets, 28-gage	4 75 a	4 85
Blue annealed, 10-gage	2 40 a	2 60
Tank plates, 3/4 and heavier	2 25 a	.....

## RUBBER PRICES GOING UP

Since our last report the price of rubber has advanced perceptibly. Up-River rose gradually from 69 to 97, the latter figure representing the highwater mark reached since our last writing. Manufacturers are purchasing sparingly pending new developments in the general situation, which points toward a decided increase in prices. Quotations on January 11th were:

<b>Para—</b>			
Up-river, fine	96 a	..	
Up-river, coarse	77 a	..	
Islands, fine	91 a	92	
Islands, coarse	49 a	50	
Caucho ball, upper	80 a	81	
Caucho ball, lower	78 a	79	
Cameta	52 a	..	
<b>Ceylon—</b>			
First latex pale crepe	1 03 a	..	
<b>Brown crepe</b>	1 02 a	..	
<b>Smoked sheets</b>	1 02 a	..	
<b>Centrais—</b>			
Corinto	75 a	..	
Esmeralda	74 a	..	
Guayule	..	..	
Balata, sheet	58 a	60	
Balata, block	40 a	47	
<b>African—</b>			
Massal, red	..	..	

### DOMESTIC SCRAP RUBBER

Boots and shoes	9 1/2 a 10
<b>Tires—</b>	
Automobile	5 1/2 a 5 1/2
Bicycle, pneumatic	3 1/2 a 3 1/2
Inner tubes, No. 1	27 1/2 a
Inner tubes, No. 2	11 1/2 a 12

The strongest argument in favor of the cross-licensing agreement has been the fact that no matter how many patents any single company owned, it was certain that license rights under the aggregation of patents of all the other companies would be of more value than any one member's individual patents.

This extraordinary plan to exchange licenses among motor car builders has caused astonishment among leaders of other industries, who look upon it as one of the greatest pieces of co-operation that has been recorded in business.

## MOTOR TRUCK CLUB OF AMERICA ELECTS OFFICERS

The Motor Truck of America, Inc., at its annual meeting on Wednesday, December 15th, in the rooms of the Automobile Club of America, New York City, re-elected T. D. Pratt, president. The other officers elected are: C. Roderick Stephens, first vice-president; David C. Fenner, second vice-president; Haywood P. Cavarly, third vice-president; Nathaniel Mallouf, treasurer; Ellis L. Howland, secretary. The directors are: Geo. H. Pride, Jas. K. Orr, Emanuel Lascaris, Elmer B. Clark and A. J. Slade.

A discussion was held on the proposed Federal tax on gasoline, and it was decided that the executive committee take action and protest against the tax in the interests of the members of the club.

**Pierce-Arrow** 3-ton trucks will use exclusively Elsemann Magneto Type EM4 (Dual) and Elsemann Coil Type DCR. The Pierce-Arrow 2-ton trucks will use exclusively Elsemann Magneto waterproof Type G4 for the coming year. Deliveries will begin in February.

# Activities of the Motor Truck Association of Philadelphia

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President  
**J. D. HOWLEY**  
Treasurer

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COMMERCIAL CAR JOURNAL OFFICIAL ORGAN

**D**EALING with the question of highways in the United States, and the application of power vehicles to the warfare in Europe, S. M. Williams and John R. Eustis, of the New York Mail, made the last month's gathering of the Philadelphia Motor Truck Association at the Hotel Adelphia, one of the most interesting sessions held by the organization this winter.

Mr. Williams is sales manager of the Garford Co. This concern has entirely, at facturer of motor trucks, has entirely at its own expense and from motives based on larger issues of public benefit, conducted for some time past a campaign in the interest of good roads.

As sales manager of the Garford Motor Truck Co., of Lima, Ohio, Mr. Williams has made field investigations and recognizes the great utility of motor trucks for rural use. His research work has also developed the fact that the lack of good roads is the barrier which must first be removed before farmers can operate motor-driven vehicles to advantage.

Appreciating the necessity in a great movement like this, for someone, individual or organization, with adequate conception of the goal to be attained and the initiative and ability to carry on the work, Mr. Williams pointed out to his audience that "no more powerful influence for the good roads movement could be obtained than the combined efforts of the motor truck and motor car manufacturer, supported by their vast army of distributors and dealers."

"Farming is a business," continued Mr. Williams, "and like any other business man the farmer must consider the important problem of transportation. Unfortunately, farmers are forced to move their crops when the roads permit.

"Good roads not only enable the farmer to take advantage of favorable market conditions in disposing of his crops, but reduce the cost of hauling at least two-thirds, according to competent authorities.

"They also have a direct bearing upon the cost of living which is a most important consideration for the consumer. We frequently hear of the low cost of living in Europe under normal conditions and when we consider that our average cost of hauling per ton mile is \$.25 compared with eight to twelve cents in those countries, we realize that we are paying a heavy tribute to bad roads. A reduction in the cost of transportation means, lowering the market price.

"Also the supply of farm products which generally determines their market price, depends upon the condition of the country roads. A shortage sends the prices soaring and the consumer must dig deep into his pocket to make the purchase.

"That land values are increased by road improvement is proven by investigations made by the United States Office of Public Roads. Many examples are cited where an outlay of from \$1 to \$4 per acre enhanced land valued from \$10 to \$50 per acre. It is claimed that New York State's system of improved and connected highways has been one of its greatest assets in the last few years, for in 1914, these roads invited more than 250,000 non-resident tourists, which spent millions of dollars within its borders.

"You are, no doubt, wondering why I have been dealing with the conditions and necessities of the farmer and of the rural districts? It is because in nearly all cases they control the situation, also for the reason that I believe that the greater possibilities form both the motor truck and motor car will come from the rural districts. It rests with those of the industry, however, as to how soon we will receive these benefits. While there is a general awakening throughout the country to the value and necessity of road improvement, we sometimes wonder why we are not getting more satisfactory results from the amount of good roads agitation that has been carried on for years.

## Public Not Convinced

"Is it because we have not satisfied the public with the character of roads we are building, or is it that the public does not realize the actual profit to be derived from good road investment?

"The officials of the Garford Motor Truck Co. have been so thoroughly impressed with the importance of this work, and its value to our own individual interests that we were determined to prove its value. Within the last ten days we addressed a letter to 21,000 automobile dealers in the United States. A stamped, self-addressed envelope was also enclosed for the return of a list of questions regarding the road conditions in each territory and their influence upon the promotion of both the motor truck and motor car business.

"To one who has not given the matter consideration the replies are astonishing, and more so when you realize the little interest manifested by the industry toward the improvement of such conditions. Up to and including Monday, December 13th, we had received a total of 1526 replies. Of this number 426 stated that the roads in their territory were good, 345 stated that they were only fair, and only for certain seasons of the year; 640 stated the roads in their territory were bad.

"Showing the influence of road conditions upon the economic use of the motor car and motor truck, 594 of these dealers replied they believed that the use of the motor truck was practically prohibited during three to six months of the year; 382

contended that roads were impassable for motor vehicles during six to nine months, and 259 stated that during practically only three months of the year were the roads passable.

## Would Increase Sales

"That permanent, improved roads in their territories would enable them to increase their sales of motor vehicles from 25 to 50 per cent. was the contention of 615 of the dealers that replied, 344 put down from 50 to 75 per cent. and 288 of the dealers stated they could increase their business over 75 per cent.

"A large number of those handling pleasure cars exclusively stated they would handle trucks if road conditions in their territory were such as would permit the economic use of the trucks and therefore give them a market.

"I am very glad to say that a Federal highway bill is about to be introduced in Congress. It provides for an annual highway appropriation by the Government to be divided among the States in proportion to area, population and road mileage, each State to appropriate an amount equal to that offered by the national Government. This legislation is being supported by the National Automobile Chamber of Commerce, at least to the extent of their mailing circular letters to their membership, urging co-operation toward its passage."

## Trucks in the War

"Mr. Eustis, with the assistance of a series of photographs taken in the war zone, showed the amazing applications of power vehicles that have been made by the warring nations. The impression made by these pictures is that a war of automobiles is raging.


"There is hardly a use to which the motor vehicles have not been applied. Trucks or autos haul the troops from point to point, with astonishing speed, they are used as armored instruments of war, they carry food for the soldiers, they are hospitals on wheels caring for the wounded, they transport aeroplanes, they dig trenches, they are the passenger vehicles for officers and scouts.

The meeting was the annual gathering of the association and officers for the coming year were elected as follows:

President, Emlen S. Hare; vice-president, Lee J. Eastman; treasurer, John D. Howley, and secretary, W. H. Metcalf. The board of directors will consist of D. H. Zimmerman, O. W. Doolittle, E. M. Bartlett, P. S. Russell and H. M. Coale.

President Hare thanked the association for the compliment of his election, mapped out an aggressive line of work for the year, and on behalf of the association made valuable gifts of jewelry to the retiring president, E. B. Jackson and to the secretary, W. H. Metcalf.

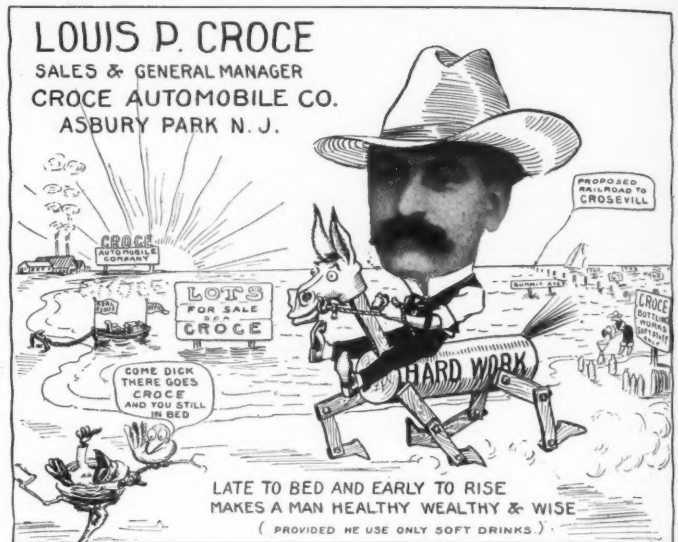
# CCJ GALLERY of SALES MANAGERS



**R.C. SYKES**  
SALES MANAGER  
TROY WAGON WORKS CO.

ITS JUST AS EASY TO DOUBLE THE LOAD

THE HUNTER OF BIG GAME



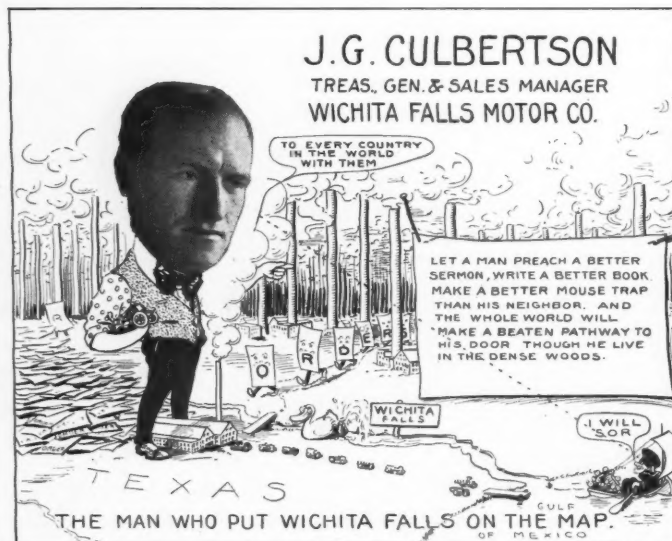
**LOUIS P. CROCE**  
SALES & GENERAL MANAGER  
CROCE AUTOMOBILE CO.  
ASBURY PARK N. J.

PROPOSED RAILROAD TO CROCEVILLE

LOTS FOR SALE OF CROCE

COME DICK THERE GOES CROCE AND YOU STILL IN BED

LATE TO BED AND EARLY TO RISE MAKES A MAN HEALTHY WEALTHY & WISE  
( PROVIDED HE USE ONLY SOFT DRINKS )



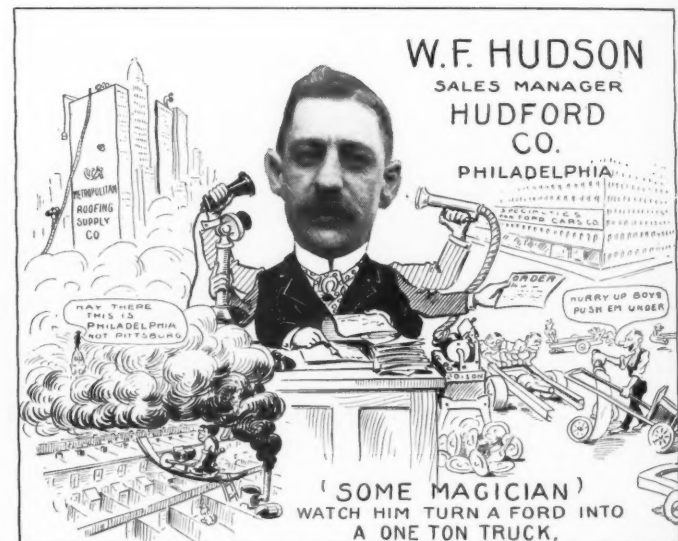
**J.G. CULBERTSON**  
TREAS. GEN. & SALES MANAGER  
WICHITA FALLS MOTOR CO.

TO EVERY COUNTRY IN THE WORLD WITH THEM

LET A MAN PREACH A BETTER SERMON, WRITE A BETTER BOOK, MAKE A BETTER MOUSE TRAP THAN HIS NEIGHBOR, AND THE WHOLE WORLD WILL MAKE A BEATEN PATHWAY TO HIS DOOR. THOUGH HE LIVE IN THE DENSE WOODS.

TEXAS

THE MAN WHO PUT WICHITA FALLS ON THE MAP.



**W.F. HUDSON**  
SALES MANAGER  
HUDFORD CO.  
PHILADELPHIA

METROPOLITAN ROOFING SUPPLY CO.

HAY THERE THIS IS PHILADELPHIA NOT PITTSBURG

HURRY UP BOYS PUSH EM UNDER

'SOME MAGICIAN' WATCH HIM TURN A FORD INTO A ONE TON TRUCK.



**SAMUEL H. COOK**  
SALES MANAGER  
BROWN-LIPE CHAPIN CO.  
SYRACUSE N.Y.

WE ASK YOU IN THE NAME OF THE GREAT UNITED STATES OF SYRACUSE NOO YOURK TO FILL IN SOME OF YOUR IDLE TIME SERVING AS OUR MAYOR

YOU HAVE NOTHING TO DO LET'S HAVE A GAME

COME ON! YOU HAVE NOTHING TO DO GIVE US A LITTLE MORE OF YOUR TIME.

SYRACUSE



**F.W. SINRAM**  
SALES MANAGER  
VAN DORN & DUTTON CO.  
CLEVELAND OHIO.

AN INSPIRATION WITH EVERY PUFF - AND NEARLY ALL ARE GEARS

CRACK AS NEEDED

The CCJ brings greatest returns to advertisers because of largest circulation among quantity buyers

# ***Buyers' Information Commercial Car Review***

***(Eastern Section)***

On the following pages is given a complete review of the Commercial Car Models which will be manufactured for the coming season by Eastern American Manufacturers.

See Complete Indexes on Pages 38 and 39

**T**HIS is the first or Eastern Section of the Review, and includes cars manufactured in the following States: Connecticut, Delaware, District of Columbia, Georgia, Kentucky, Maryland, Massachusetts, New York, New Hampshire, New Jersey, North Carolina, Ohio and Pennsylvania.

The second or Western Section will be issued February 15th, and will contain a review of cars made in the following States: California, Illinois, Indiana, Iowa, Louisiana, Michigan, Minnesota, Missouri, Nebraska, Oregon, Texas, Washington and Wisconsin.

The data given in this Review was supplied direct by the makers, and is as correct as can be obtained up to the date of publication.

**Key to Abbreviations** will be found on the leaf attached to this page; when this is opened out it will be found very convenient to refer to, no matter which pages of the Review are consulted. Indexes will be found on pages 38 and 39.

**Criticisms and Suggestions** on this Buyers' Information Review are invited. We want to know whether it meets requirements and how it can be made better, if possible.

**Horse Power.**---All horse powers are calculated by the S. A. E. formula:  $H. P. = \frac{D^2 N}{2.5}$ , where D = bore in inches and N = number of cylinders.

On the other side of this leaf will be found the key to the abbreviations used in the

## ***Buyers' Information Commercial Car Review***

While consulting the Review, turn this leaf out so that it extends beyond the book, it will then be convenient for reference, no matter how many pages you turn to.

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Indexes arranged alphabetically and according to price are on pages 38 and 39.





# KEY OF ABBREVIATIONS

## USED IN THE

# Buyers' Information Commercial Car Review

**Chassis Weight:** Given in pounds and includes weight of chassis only.

**Price:** In the table the prices are for chassis only. In the captions, the prices are for the car complete with body as shown in the illustration, unless otherwise stated.

**Bodies:** Gives the styles of bodies carried as standard stock. Bodies other than those indicated can usually be had on order. Prices of these bodies, where obtainable, are given in the captions under the illustrations. P, panel; S, stake; FB, Flareboard; C, canopy top; E, express; D, power dump.

**Load Platform Height:** In inches.

**Maximum Speed:** In miles per hour.

**Horse Power:** Calculated by the S. A. E. formula, 4-cycle  $H. P. = \frac{D^2 N}{2.5}$ ; D = bore in inches, N = number of cylinders.

**Cylinders Cast:** 1, singly; 2, pairs; 4, in fours; 6, in sixes.

**Cooling:** T, thermo-syphon; G, gear pump; C, centrifugal pump; A, air; W, water.

**Radiator:** H, honeycomb; T, tubular; C, cellular; V, vertical.

**Carburetor:** B, Breeze; C, Carter; F, Flechter; FR, French; H, Holley; K, Kingston; M, Marvel; MU, Muir; MY, Mayer; O, optional; R, Rayfield; SB, Stromberg; SL, Schebler; SP, special; SU, S. U.; Z, Zenith; ZP, Zephyr.

**Ignition:** A, Atwater Kent; B, Bosch; BL, Berling; BR, Briggs; BT, Battery; C, Connecticut; E, Eisemann; H, Heinze; M, Mea; MG, Magneto; R, Remy; SD, Splitdorf; W, Western Electric; WS, Westinghouse.

**Spark Plug Size:** S, S.A.E.;  $\frac{1}{2}$ ,  $\frac{1}{2}$  in. pipe; M, Metric.

**Lubrication:** S, splash; F, force-feed.

**Clutch:** B, band; C, cone; D, disc.

**Drive:** B, bevel gear; C, chain; W, worm; IG, internal gear; R, roller; S, shaft; SP, spur.

**Transmission:** S, selective; P, progressive; L, planetary; F, friction; IC, individual clutch.

**Type Rear Axle:** D, dead; F, floating; S, semi-floating;  $\frac{3}{4}$ ,  $\frac{3}{4}$  floating.

**Tires:** Solid unless otherwise indicated —\*, pneumatic; D, dual; T, Triple; S, steel.

**Steering Wheel:** R, right; L, left; C, center; O, optional.

**Control Levers:** R, right, L, left; C, center; O, optional.

**Wheelbase:** In inches.

**Engine Starter:** A, Apelco; AL, Auto Lite; BJ, Bijur; D, Delco; DS, Disco; EZ, Entz; GD, Gray & Davis; J, Jesco; WS, Westinghouse; X, extra.

### ADDITIONAL ABBREVIATIONS USED ON ELECTRICS

**Motor:** C, compound; F, four-pole; S, series.

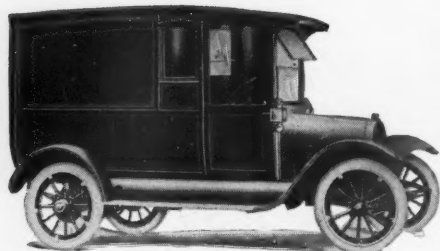
**Controller:** B, barrel; C, continuous torque; D, drum; F, flat; G, General Electric; M, magnetic; W, Westinghouse.

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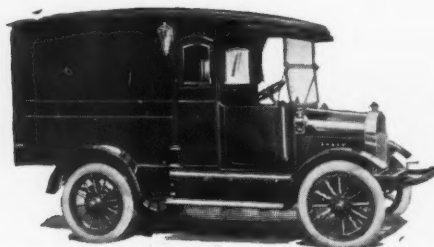
Indexes arranged alphabetically and according to price, are on pages 38 and 39

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FIRST HALF OF REVIEW. LAST HALF WILL BE IN FEBRUARY ISSUE



Atlas 1000-lb. Panel, \$775.  
Also Panel with Windshields; 6 Post Covered Express, \$727.50.  
Made by Martin Carriage Works.



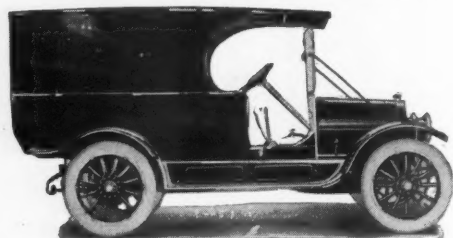
Vim Type 18, 1000-lb. Model U, Panel, \$875.  
Also Model F, Covered Flareboard, \$695; Model De Luxe Panel, \$725; Model S, Salesman's Car, \$775.



Rush Model B, 1000-lb. Panel, Chassis, \$825.  
Also Panel, \$730; Flareboard, \$700.



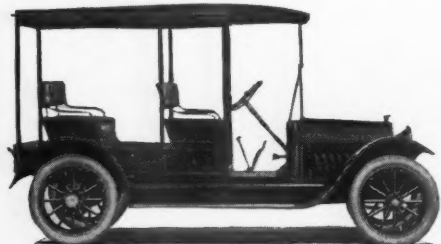
Henderson Model C, 1200-lb. Panel, \$1295.  
Also Stake, \$1225; Flareboard, \$1295.



Overland Model 83, 800-lb. Panel, \$750.  
Also Flareboard, \$725.  
Made by Willys-Overland Co.



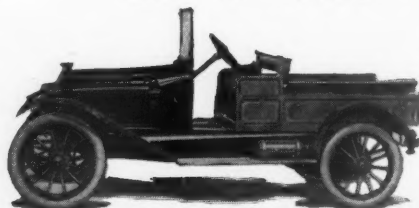
Trumbull Model 16-D, 500-lb. Covered Express, \$410.  
Also Panel, \$425.



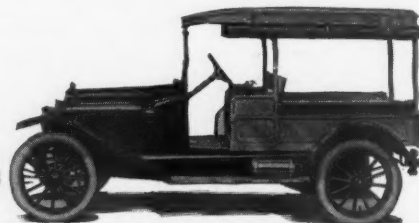
Hatfield Model I, 800-lb. Suburban, \$720.  
Also Model J, Panel, \$750; Model K, Flareboard, \$690.  
Made by Cortland Cart & Carriage Co.



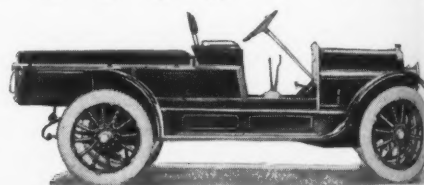
Bessemer Model G, 1500-lb. Flareboard, Chassis, \$975.



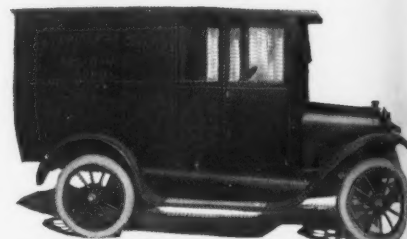
Metz Model A, 800-lb. Flareboard, \$500.  
Also Covered Flareboard, \$525; Panel, \$600.



Metz Model C, 800-lb. Covered Flareboard, \$525.  
Also Flareboard, \$500; Panel, \$600.



Overland Model 83, 800-lb. Flareboard, \$725.  
Also Panel, \$750.  
Made by Willys-Overland Co.



Fostoria Model D, 1000-lb. Panel, \$695.  
Also Covered Flareboard, \$625.

### 800 Pound Gasoline

Model	Chassis Weight	Chassis Price	Styles of Stock Bodies Furnished	Height of Loading Platform	Maximum Speed	Horse Power	Cylinders	Bore	Stroke	Cylinders Cast	How Cooled	Transmission	Cardinal
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.....	.....	.....	Cortland Cart & Carriage Co., Sidney, N. Y. P, FB	35	23	4	3.75	4.25	4	T			
25	1650	535	Metz Co., Waltham, Mass. P, E, C	24	4	3.87	4	4	T				
83	1983	.....	Willys-Overland Co., Toledo, Ohio.	35	45	27	4	4.12	4.5	1	T		

### 1000 Pound Gasoline

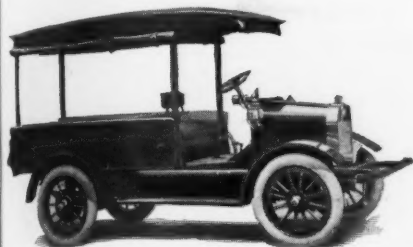
Elco	.....	485	Bimel Buggy Co., Sidney, Ohio.	45	14	4	3	4	4	T			
H	1700	850	Chester County Motor Co., Coatesville, Pa.	32	25	17	4	3.25	5	4	W		
21	1700	620	Chadwick Engineering Works, Pottstown, Pa.	28	27	16	4	3.12	4.5	4	T		
B	.....	600	Duryea Laboratories, Rochester, N. Y.	19	2	3.75	3.75	4	A				
A	1300	485	Fostoria Light Car Co., Fostoria, Ohio.	34	15	26	4	3.5	4.25	4	T		
D	.....	600	Kearns Motor Truck Co., Beavertown, Pa.	40	17	4	3.25	5	4	T			
M	1950	.....	Lippard-Stewart Motor Car Co., Buffalo, N. Y.	30	20	17	4	3.25	5	4	T		
.....	.....	660	Martin Carriage Works, York, Pa.	17	4	3.25	5	4	T				
B	1600	625	Rush Delivery Car Co., Philadelphia, Pa.	25	17	4	3.25	5	4	T			
B-16	.....	600	Sphinx Motor Car Co., York, Pa.	17	4	3.25	5	4	T				
18	1850	620	Vim Motor Truck Co., Philadelphia, Pa.	30	25	14	4	3	4.5	4	T		

### 1200 Pound Gasoline

A-16	1800	.....	Bell Motor Car Co., York, Pa.	26	35	17	4	3.25	5	4	T		
C	2200	1100	Henderson Bros., N. Cambridge, Mass.	30	28	23	4	3.5	5	4	T		

### 1500 Pound Gasoline

G	2200	975	Bessemer Motor Truck Co., Grove City, Pa.	22	20	4	3.5	5	4	T			
64	.....	1350	Garford Motor Truck Co., Lima, Ohio.	18	20	4	3.5	5.12	4	T			
B	2000	940	Howard Motor Truck Co., Boston, Mass.	20	20	4	3.5	5	4	T			



Vim Type 18, 1000-lb. Model F, Covered Flareboard, \$695.  
Also Model U, Panel, \$875; Model De Luxe Panel, \$725; Model S, Salesman's Car, \$775.



Metz Model E, 800-lb. Panel, \$600 with Electric Equipment.  
Also Flareboard, \$500; Covered Flareboard, \$525.



Vim Type 18, 1000-lb. Model S, Salesman's Car, \$775.  
Also Model F, Covered Flareboard, \$695; Model U, Panel, \$875; Model De Luxe, Panel, \$725.

### Commercial Cars

Manufacturer	Ignition	Spark-Plug Size	Lubrication	Clutch	Drive	Transmission	Speeds Forward	Type Rear Axle	Front Tires	Rear Tires	Steering Wheel	Brake and Gear Levers	Wheelbase	Engine Starter	% Total Weight on Rear Wheels
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SB	C	S	SF	D	B	S	3	F	31x4*	31x4*	L	C	106	DS	40
	MG	1/2	S	..	..	F	7	..	32x3 1/2*	32x3 1/2*	L	C	108	GD	..
	SD	1/2	S	C	B	S	3	..	33x4*	33x4*	L	C	106	AL	70

### Commercial Cars

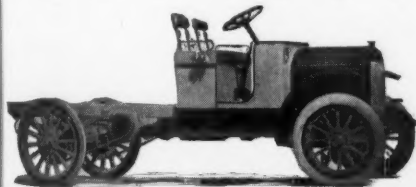
EP	BT	S	S	D	Bimel Buggy Co., Sidney, Ohio.	B	S	3	..	30x3 1/2*	30x3 1/2*	L	C	102	DS	..
R	BL	1/2	F	D	Chester County Motor Co., Coatesville, Pa.	W	S	3	F	31x4*	31x4*	..	C	100	..	75
	MG	S	F	D	Chadwick Engineering Works, Pottstown, Pa.	B	S	3	S	30x3 1/2*	30x3 1/2*	L	C	102	X	..
K	B	1/2	..	..	Duryea Laboratories, Rochester, N. Y.	R	..	2	D	34x1 1/4	42x1 1/4	L	C	84	..	..
Z	A	S	SF	D	Fostoria Light Car Co., Fostoria, Ohio.	S	S	3	S	30x3 1/2*	30x3 1/2*	..	C	108	..	60
M	SD	S	S	C	Kearns Motor Truck Co., Beavertown, Pa.	B	S	3	S	30x3 1/2*	30x3 1/2*	R	C	107	DS	60
Z	A	S	F	C	Lippard-Stewart Motor Car Co., Buffalo, N. Y.	W	S	3	S	33x4*	33x4*	L	C	106	EZ	68
C	SD	S	SF	C	Martin Carriage Works, York, Pa.	E	S	3	3/4	30x3 1/2*	30x3 1/2*	..	C	106	..	..
C	MG	S	S	C	Rush Delivery Car Co., Philadelphia, Pa.	B	S	3	F	30x3 1/2*	30x3 1/2*	L	C	104	..	70
MY	C	S	S	C	Sphinx Motor Car Co., York, Pa.	B	S	3	S	30x3 1/2*	30x3 1/2*	L	C	112	A	..
SB	SD	S	S	C	Vim Motor Truck Co., Philadelphia, Pa.	B	S	3	3/4	31x4*	31x4*	L	C	97	..	60

### Commercial Cars

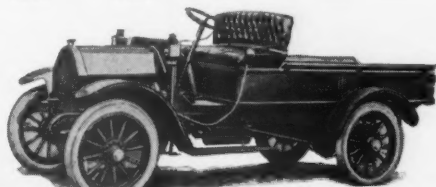
EL	A	S	S	C	Bell Motor Car Co., York, Pa.	B	S	3	F	31x4*	31x4*	L	C	112	DS	55
SB	B	S	SF	D	Henderson Bros., N. Cambridge, Mass.	W	S	3	S	34x4	34x4	L	C	115	..	65

### Commercial Cars

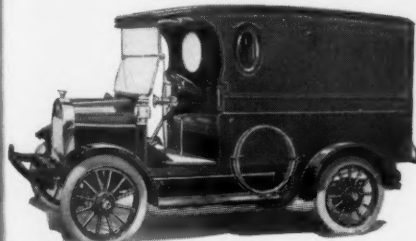
R	B	S	SF	C	Bessemer Motor Truck Co., Grove City, Pa.	IG	S	3	D	35x3	35x3 1/2	..	C	124	..	67
R	SD	..	S	D	Garford Motor Truck Co., Lima, Ohio.	C	S	3	D	34x4 1/2*	36x3 1/2	..	C	120	..	..
EB	E	S	S	C	Howard Motor Truck Co., Boston, Mass.	B	S	3	3/4	32x4*	32x4*	L	C	115	..	70



Garford Model 64, 1500-lb. Chassis, \$1350.



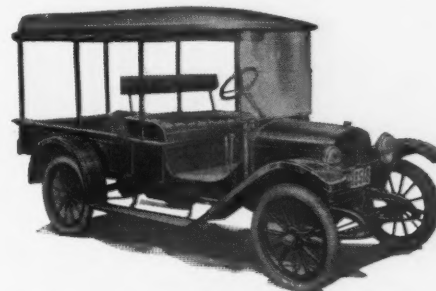
Howard Model B, 1500-lb. Flareboard, \$990.  
Also Panel, \$1080; Stake, \$1020.



Vim Type 18, 1000-lb. Model De Luxe Panel, \$725.  
Also Model F, Covered Flareboard, \$695; Model U, Panel, \$875; Model S, Salesman's Car, \$775.



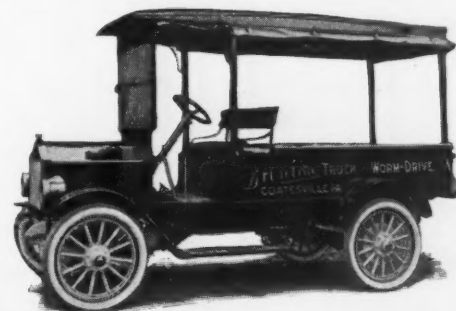
Sphinx Model B-16, 1000-lb. Panel, \$675.



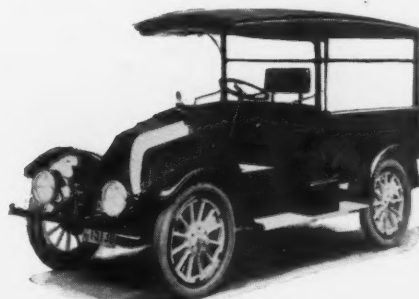
Fostoria Model A, 1000-lb. Covered Flareboard, \$625.  
Also Panel, \$695.



Duryea Model B, 1000-lb. Panel, Chassis, \$600.

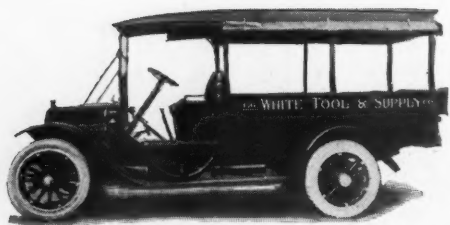


Brinton Model H, 1000-lb. Covered Flareboard, Chassis, \$850.  
Made by Chester County Motor Co.

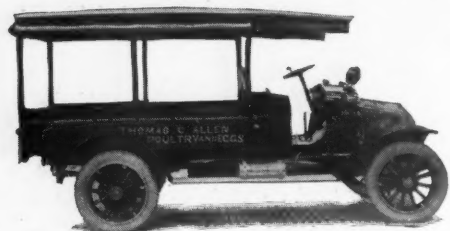


Lippard-Stewart Model M, 1000 lb. Canopy Top.

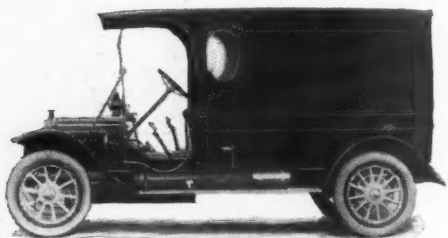
BODY DETAILS OF CARS NOT ILLUSTRATED  
Chadwick Type 21, 1000-lb. Panel, \$720.  
Also Covered Flareboard, \$695.



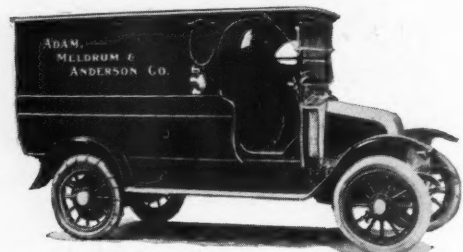
Gabriel Model H, 1500-lb. Covered Flareboard, Chassis, \$1600.  
Also Panel, \$1800; Stake, \$1750; Flareboard, \$1750.



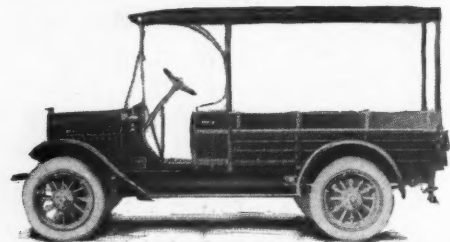
Krebs Model F, 1500-lb. Covered Flareboard, Chassis, \$1600.  
Also Panel, \$1825; Stake, \$1750; Flareboard, \$1750.



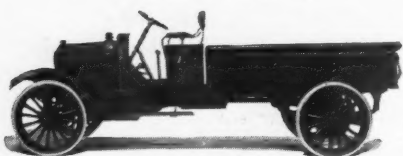
Lippard-Stewart Model C, 1500-lb. Panel.



White Model GBBE, 1500-lb. Panel, Chassis, \$2100.



Stewart Model 3, 1500-lb. Covered Flareboard, Chassis, \$1250.



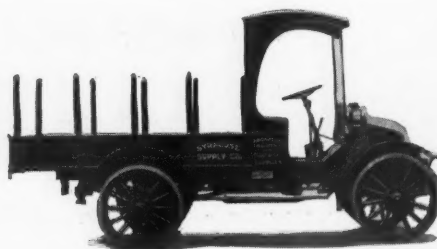
Chase Model 3-A, 1 ton Flareboard, Chassis, \$1650.

BODY DETAILS OF CARS NOT ILLUSTRATED

Auglaize Model E, 1500-lb. Stake, \$1025.  
Also Flareboard, \$1015.

Auglaize Model F, 1 ton Stake, \$1325.  
Also Flareboard, \$1325.

Corbitt Model F, 1 ton Panel, \$2150.  
Also Stake, \$2100; Flareboard, \$2100.



Palmer-Moore Model K, 1500-lb. Stake, \$1285.  
Also Panel, \$1300; Stake, \$1200; Flareboard, \$1200; Flareboard with top, \$1250.



Adams Model A, 1 ton Covered Flareboard, Chassis, \$1850.  
Also Panel, \$2150; Stake, \$1975; Flareboard, \$2025.

## 1500 Pound Gasoline

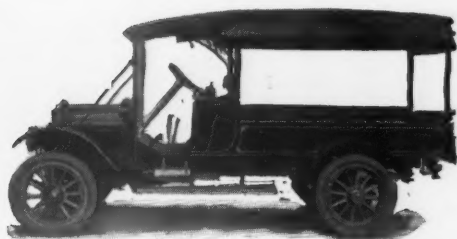
Model	Chassis Weight	Chassis Price	Styles of Stock Bodies Furnished	Height of Loading Platform	Maximum Speed	Horse Power	Cylinders	Bore	Stroke	Cylinders Cast	How Cooled
E	....	975	Auglaize Motor Car Co., New Bremen, Ohio. S, FB	30	15	20	4	3.5	5	4	T
H	2500	1600	Gabriel Auto Co., Cleveland, Ohio. P, S, FB	35	30	27	4	4.12	5.5	4	C
F	2450	1600	Krebs Commercial Car Co., Clyde, Ohio. P, S, FB	30	20	23	4	3.75	5	4	T
G	2700	....	Lippard-Stewart Motor Car Co., Buffalo, N. Y. P, S	33	25	23	4	3.75	5.25	4	C
CW	2900	....	P, S	33	25	23	4	3.75	5.25	4	C
K	2800	1150	Palmer-Moore Co., Syracuse, N. Y. P, S, FB, C	34	20	20	4	3.5	5.12	4	T
3	2700	1290	Stewart Motor Corp., Buffalo, N. Y. P, S, FB	30	35	20	4	3.5	5.12	4	T
3	2700	1290	P, S, FB	30	35	20	4	3.5	5.12	4	T
A	2500	1600	Tiffin Wagon Co., Tiffin, Ohio. .....	32	17	23	4	3.75	4.5	4	T
GBBE	....	2100	White Co., Cleveland, Ohio. .....	..	..	23	4	3.75	5.12	4	C

## 1 Ton Gasoline

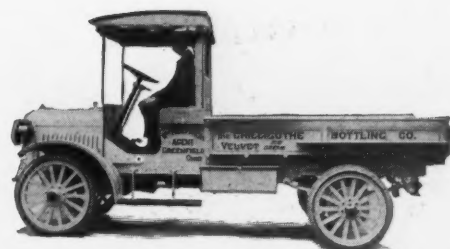
6-B	3950	1775	Atterbury Motor Car Co., Buffalo, N. Y.	13	23	4	3.75	5.25	4	C	
A	3320	1850	Adams Truck, Fdy. & Mch. Co., Findlay, Ohio.	40	22	23	4	3.75	5.25	4	W
A	3320	1850	P, S, FB	40	22	23	4	3.75	5.25	4	W
A	3320	1850	P, S, FB	40	22	23	4	3.75	5.25	4	W
F	....	1200	Auglaize Motor Car Co., New Bremen, Ohio.	30	15	20	4	3.5	5	4	G
..	3300	1250	Auto-Truck Co., Bangor, Pa.	35	25	32	4	3.5	5.12	4	T
U	....	2000	C. L. Barker, Norwalk, Conn.	..	..	26	4	4	5	..	T
3A	....	1650	Chase Motor Truck Co., Syracuse, N. Y.	31	20	20	4	3.5	5.12	4	T
26	2900	1500	Commercial Truck Co., Cleveland, Ohio.	32	25	18	4	3.37	5	4	T
26	2900	1500	.....	32	25	18	4	3.37	5	4	T
26	2900	1500	.....	32	25	18	4	3.37	5	4	T
26	2900	1500	.....	32	25	18	4	3.37	5	4	T
F	3500	2000	Corbitt Automobile Co., Henderson, N. C.	40	15	27	4	4.12	5.5	4	C
10	2800	....	Eclipse Motor Co., Cleveland, Ohio.	..	20	23	4	3.75	5	4	T
10	2800	....	.....	..	20	23	4	3.75	5	4	T
75	....	1450	Garford Motor Truck Co., Lima, Ohio.	17	20	4	3.5	5.12	4	T	
.....	3800	1500	Gramm-Bernstein Co., Lima, Ohio.	40	18	20	4	3.5	5.25	4	T
O	3000	1800	Gabriel Auto Co., Cleveland, Ohio.	38	25	27	4	4.12	5.5	4	C
D	2300	1500	Henderson Bros., N. Cambridge, Mass.	32	23	27	4	3.75	5	4	T
.....	....	1750	Hurlburt Motor Truck Co., New York City.	..	20	20	4	3.5	5.12	4	..
.....	....	1750	.....	..	20	20	4	3.5	5.12	4	..
AB	4050	2000	International Motor Co., New York City.	34	18	26	4	4	5	2	C
AB	4050	2000	.....	34	18	26	4	4	5	2	C
K	2900	870	H. J. Koehler S. G. Co., Newark, N. J.	35	30	20	4	3.5	5	4	T
G	3250	2000	Krebs Commercial Car Co., Clyde, Ohio.	32	15	23	4	3.75	5.25	4	C
G	3250	2000	P, S, FB	32	15	23	4	3.75	5.25	4	C
H	3250	....	Lippard-Stewart Motor Car Co., Buffalo, N. Y.	..	18	23	4	3.75	5.25	4	C
L	4100	2100	Maccar Truck Co., Scranton, Pa.	34	16	27	4	4.12	5.25	4	C
K	4200	2100	.....	34	16	27	4	4.12	5.25	4	C
L	4100	2100	.....	34	16	27	4	4.12	5.25	4	C
K	4200	2100	.....	34	16	27	4	4.12	5.25	4	C
M	3200	1350	Palmer-Moore Co., Syracuse, N. Y.	34	18	23	4	3.75	5.12	4	T
			P, S, FB, C	34	18	23	4	3.75	5.12	4	T



Gabriel Model O, 1 ton Flareboard, Chassis, \$1800.  
Also Panel, \$2000; Stake, \$1950; Flareboard, \$1950.



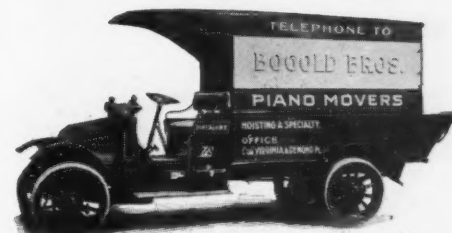
Henderson Model D, 1-ton Covered Flareboard, Chassis, \$1500.  
Also Stake, \$1650; Flareboard, \$1695; Panel, \$1725.



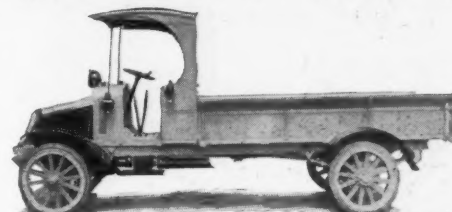
Gramm-Bernstein 1 ton Flareboard, Chassis, \$1500.



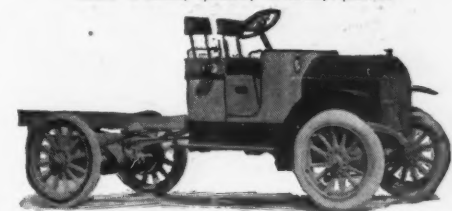
Koehler Model K, 1 ton Covered Flareboard, \$895.



Lippard-Stewart Model H, 1 ton Piano Body.



Krebs Model G, 1 ton Flareboard, \$2175.  
Also Panel, \$2225; Stake, \$2175.



Garford Model 75, 1 ton Chassis, \$1450.



Palmer-Moore Model M, 1 ton Stake, \$1510.  
Also Panel, \$1525; Stake, \$1425; Flareboard, \$1425; Flareboard with Top, \$1475.



Tiffin Model A, 1500-lb. Flareboard, Chassis, \$1600.

## Commercial Cars

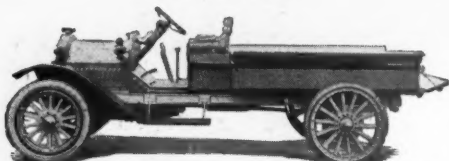
Carburetor	Ignition	Spark-Plug Size	Lubrication	Clutch	Drive	Transmission	Speeds Forward	Type Rear Axle	Front Tires	Rear Tires	Steering Wheel	Brake and Gear Levers	Wheelbase	Engine Starter	% Total Weight on Rear Wheels				
B	B	1/2	F	D	Auglaize Motor Car Co., New Bremen, Ohio.														
					IG	S	3	D	36x3	36x3 1/2	L	C	124	D	70				
	E	S	SF	C	Gabriel Auto Co., Cleveland, Ohio.														
					B	S	3	F	34x4 1/2*	34x4 1/2*	L	C	126	..	60				
EL	MG	S	S	C	Krebs Commercial Car Co., Clyde, Ohio.														
					W	S	3	F	34x4 1/2*	34x4 1/2*	L	C	120	..	..				
	E	S	SF	C	Lippard-Stewart Motor Car Co., Buffalo, N. Y.														
					B	S	3	F	35x4 1/2*	35x4 1/2*	L	C	125	..	65				
	E	S	SF	C					W	S	3	F	34x3	34x4	L	C	125	..	65
	B	S	F	D	Palmer-Moore Co., Syracuse, N. Y.														
					IG	S	3	D	36x3	36x3 1/2	L	C	106	..	66				
	B	S	S	D	Stewart Motor Corp., Buffalo, N. Y.														
					IG	S	3	F	34x4 1/2*	34x4 1/2*	L	C	118	WS	67				
	B	S	S	D					IG	S	3	F	34x4 1/2*	34x4 1/2*	L	C	128	WS	67
	B	S	S	C	Tiffin Wagon Co., Tiffin, Ohio.														
					C	S	3	D	.....	.....	L	C	112	..	65				
	MG	S	SF	D	White Co., Cleveland, Ohio.														
					B	S	4	S	34x4 1/2*	34x4 1/2*	L	C	134	..	..				

## Commercial Cars

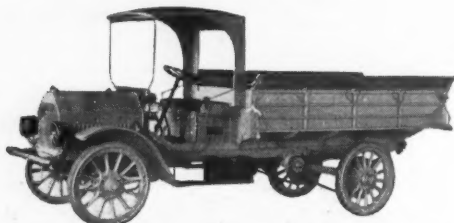
B	S	S	D	W	S	4	F	Atterbury Motor Car Co., Buffalo, N. Y.	36x3½	36x5	R	R	141	..	65
E	½	S	D	C	S	3	D	Adams Truck, Fdy. & Mch. Co., Findlay, Ohio.	36x4	36x4D	L	C	136	..	70
E	½	S	D	C	S	3	D		36x4	36x4D	L	C	140	..	70
E	½	S	D	C	S	3	D		36x4	36x4D	L	C	160	..	70
B	B	½	F	D	IG	S	3	Auglaize Motor Car Co., New Bremen, Ohio.	36x3½	36x4	L	C	124	D	70
B	E	S	S	D	IG	S	3	Auto-Truck Co., Bangor, Pa.	..	4	L	C	114	..	70
B	E	S	..	D	W	S	4	C. L. Barker, Norwalk, Conn.	42x3½	42x5	L	C	130	..	80
B	B	S	SF	D	W	S	3	Chase Motor Truck Co., Syracuse, N. Y.	36x3	36x4	L	C	145	..	60
B	B	S	F	D	W	S	3	Commercial Truck Co., Cleveland, Ohio.	36x4½*	36x4*	L	C	145	..	60
B	B	S	F	D	W	S	3		36x4½*	36x4*	L	C	120	..	60
B	B	S	F	D	W	S	3		36x3	36x3½	L	C	145	..	60
B	B	S	F	D	W	S	3		36x3	36x3½	L	C	120	..	60
E	..	..	D	W	S	3	..	Corbitt Automobile Co., Henderson, N. C.	36x3½	40x4	L	C	130	..	75
MG	S	SF	D	IG	S	3	F	Eclipse Motor Co., Cleveland, Ohio.	34x4	34x4	L	C	124	..	65
MG	S	SF	D	IG	S	3	F		34x4½*	34x4	L	C	124	..	65
SD	..	S	D	W	S	3	S	Garford Motor Truck Co., Lima, Ohio.	34x4½*	36x4	..	C	120	..	..
B	S	S	D	W	IC	3	S	Gramm-Bernstein Co., Lima, Ohio.	34x3	34x4	L	C	118	WS	80
B	S	SF	C	W	S	4	F	Gabriel Auto Co., Cleveland, Ohio.	36x5*	36x5*	L	C	136	..	60
B	B	S	SF	D	W	S	3	Henderson Bros., N. Cambridge, Mass.	34x4½	34x4½	L	C	130	..	70
E	..	SF	..	W	S	3	..	Hurlburt Motor Truck Co., New York City.	35x5*	35x5*	..	..	120	..	..
E	..	SF	..	W	S	3	..		35x5*	35x5*	..	..	136	..	..
B	B	S	S	D	W	S	3	International Motor Co., New York City.	36	36D	..	C	132	..	66
B	B	S	S	D	W	S	3		36	36D	..	C	144	..	66
MG	S	F	C	IG	S	3	D	H. J. Koehler S. G. Co., Newark, N. J.	34x3	34x3½	L	C	129	..	50
MG	S	S	C	W	S	3	F	Krebs Commercial Car Co., Clyde, Ohio.	34x3½	34x4	L	C	120	..	..
MG	S	S	C	W	S	3	F		34x3½	34x3½	L	C	144	..	..
E	S	SF	C	W	S	3	F	Lippard-Stewart Motor Car Co., Buffalo, N. Y.	36x3	36x5	L	C	145	..	65
B	B	S	S	D	W	S	3	Maccar Truck Co., Scranton, Pa.	36x4	36x5	L	C	138	..	65
B	B	S	S	D	C	S	3		36x4	36x5	L	C	138	..	65
B	B	S	S	D	W	S	3		36x4	36x5	L	C	150	..	65
B	B	S	S	D	C	S	3		36x4	36x5	L	C	150	..	65
B	S	F	D	IG	S	3	D	Palmer-Moore Co., Syracuse, N. Y.	36x3½	36x4	L	C	126	..	66



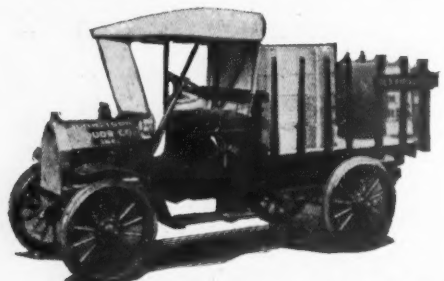
Rowe Model CW, 1 ton Covered Express, Chassis, \$2450.



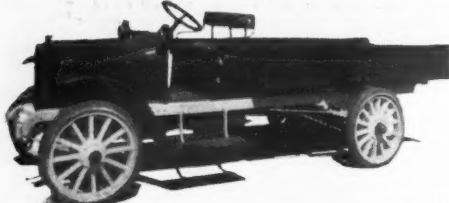
Sanford Model O, 1 ton Flareboard, \$1350. Also Stake, \$1350.



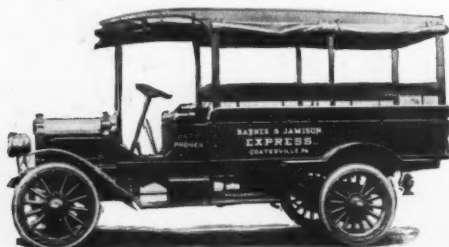
Tiffin Model G, 1 ton Flareboard, Chassis, \$2000.



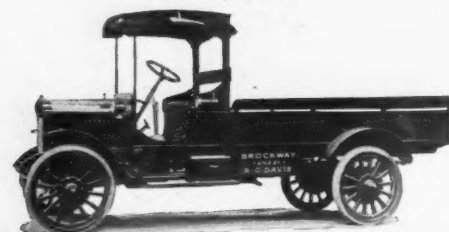
Trabold Model T, 1 ton Stake, Chassis, \$1250.



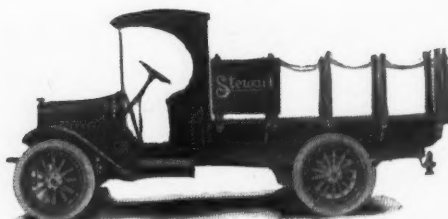
Superior Model A, 1 ton Flareboard, Chassis \$1350. Made by E. G. Willingham's Sons.



Brockway Model H, 1/4 ton Covered Flareboard, \$1775.



Brockway Model J, 1/4 ton Flareboard, \$1945.



Stewart Model 4, 1/4 ton Stake, Chassis, \$1390.



Garford Model 66, 1/2 ton Chassis, \$1800.

## 1 Ton Gasoline

Model	Chassis Weight	Chassis Price	Styles of Stock Bodies Furnished	Height of Loading Platform	Maximum Speed	Horse Power	Cylinders	Bore	Stroke	Cylinders Cast	How Cooled
C	2500	1250	Bessemer Motor Truck Co., Grove City, Pa.	22	20	4	3.5	5	4	T	
CW	....	2450	Rowe Motor Mfg. Co., Downingtown, Pa.	18	20	4	3.25	5	4	C	
T	3200	1700	Selden Motor Vehicle Co., Rochester, N. Y.	17	20	4	3.5	5	4	T	
O	2800	1290	Sanford Motor Truck Co., Syracuse, N. Y.	31	18	20	4	3.5	5.12	4	T
O	2800	1290	P. S. FB	31	18	20	4	3.5	5.12	4	T
G	3350	2000	Tiffin Wagon Co., Tiffin, Ohio.	34	15	23	4	3.75	5.25	4	C
T	3000	1250	Trabold Truck Mfg. Co., Johnstown, Pa.	36	18	20	4	3.5	5	4	..
A	2680	1350	E. G. Willingham's Sons, Atlanta, Ga.	36	17	20	4	3.5	5	4	T
A	3200	1700	Warren Motor Truck Co., Warren, Ohio.	..	20	26	4	4	4.5	2	C
AX	3750	1900	..	..	22	26	4	4	4.5	2	C
A	3200	1700	..	..	20	26	4	4	4.5	2	C
AX	3750	1900	..	..	22	26	4	4	4.5	2	C
WD-1-16	....	....	Witt-Will Co., Inc., Washington, D. C.	36	18	23	4	3.75	5.25	4	C

## 1 1/4 Ton Gasoline

H	3500	1600	Brockway Motor Truck Co., Cortland, N. Y.	36	15	23	4	3.75	5.25	4	C
H	3500	1625	..	36	15	23	4	3.75	5.25	4	C
J	3500	1825	..	36	15	23	4	3.75	5.25	4	C
J	3500	1850	..	36	15	23	4	3.75	5.25	4	C
4	3000	1390	Stewart Motor Corp., Buffalo, N. Y.	30	25	20	4	3.5	5.12	4	T

## 1 1/2 Ton Gasoline

D	3740	2300	Adams Truck, Fdy. & Mch. Co., Findlay, Ohio.	40	20	27	4	4.12	5.25	4	W
D	3740	2300	P. S. FB	40	20	27	4	4.12	5.25	4	W
XXI-F	3500	1650	Autocar Co., Ardmore, Pa.	34	25	18	2	4.75	4.5	1	C
XXI-F	3500	1650	P. S. FB, D	34	25	18	2	4.75	4.5	1	C
A	3400	1800	Bessemer Motor Truck Co., Grove City, Pa.	..	18	27	4	4.12	5.25	4	C
....	2500	2375	Crawford Automobile Co., Hagerstown, Md.	40	12	27	4	4.12	5.25	4	C
D	3500	1950	P. S. FB	40	18	23	4	3.75	5.25	4	W
.....	4600	1800	Chester County Motor Co., Coatesville, Pa.	40	18	23	4	3.75	5.25	4	W
M	3500	2000	Gramm-Bernstein Co., Lima, Ohio.	40	16	20	4	3.5	5.25	4	T
			Gabriel Auto Co., Cleveland, Ohio.	38	20	27	4	4.12	5.5	4	C



Autocar Model XXI-F, 1/2 ton Flareboard, \$1800 (SK4054). Also Stake, \$1825 (SK4063); Panel, \$1850 (SK3001); Flareboard, \$1825 (SK1119); Coal Body, \$2000 (SK4529); with Power Lift, \$2150; 70 cu. ft. Dump Body, \$2000 (SK7053); with Power Lift, \$2150; Panel, \$1875 (SK1025); Express, \$1875 (SK5112); Express, \$1890 (SK5130); Covered Flareboard, \$1825 (SK1023).



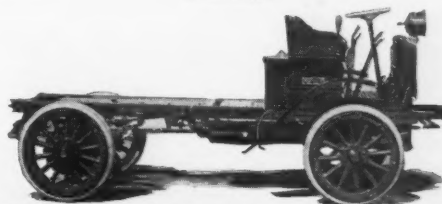
Autocar Model XXI-F, 1/2 ton Stake, \$1800 (SK4063). Also Panel, \$1850 (SK3001); Flareboard, \$1825 (SK1119); Coal Body, \$2000 (SK4529); Power Lift, \$2150; 70 cu. ft. Dump Body, \$2000 (SK7053); with Power Lift, \$2150; Panel, \$1875 (SK1025); Flareboard, \$1800 (SK4054); Express, \$1875 (SK5112); Express, \$1890 (SK5130); Covered Flareboard, \$1825 (SK1023).



Gram-Bernstein 1 1/2 ton Stake, Chassis, \$1800.

Gabriel Model M, 1 1/2 ton Tank Body, \$2200.  
Also Panel, \$2250; Stake, \$2200; Flareboard, \$2200.

Bessemer Model A, 1 1/2 ton Stake Chassis, \$1800.

Adams Model D, 1 1/2 ton Covered Flareboard, Chassis, \$2300.  
Also Panel, \$2600; Stake, \$2425; Flareboard, \$2475.Brinton Model D, 1 1/2 ton Flareboard, Chassis, \$1950.  
Made by Chester County Motor Co.Autocar Model XXI-F, 1 1/2 ton Coal Body, \$2000 (SK4529); with Power Lift, \$2150.  
Also Stake, \$1825 (SK4063); Panel, \$1850 (SK3001); Flareboard, \$1825 (SK1119); 70 cu. ft. Dump Body, \$2000 (SK7053); with Power Lift, \$2150; Panel, \$1875 (SK1025); Flareboard, \$1800 (SK4054); Express, \$1875 (SK5112); Express, \$1890 (SK5130); Covered Flareboard, \$1825 (SK1023).Autocar Model XXI-F, 1 1/2 ton Chassis, \$1650.  
Also Stake, \$1825 (SK4063); Panel, \$1850 (SK3001); Flareboard, \$1825 (SK1119); Coal Body, \$2000 (SK4529); with Power Lift, \$2150; 70 cu. ft. Dump Body, \$2000 (SK7053); with Power Lift, \$2150; Panel, \$1875 (SK1025); Flareboard, \$1800 (SK4054); Express, \$1875 (SK5112); Express, \$1890 (SK5130); Covered Flareboard, \$1825 (SK1023).Autocar Model XXI-F, 1 1/2 ton Covered Flareboard, \$1825 (SK1023).  
Also Stake, \$1825 (SK4063); Panel, \$1850 (SK3001); Flareboard, \$1825 (SK1119); Coal Body, \$2000 (SK4529); with Power Lift, \$2150; 70 cu. ft. Dump Body, \$2000 (SK7053); with Power Lift, \$2150; Panel, \$1875 (SK1025); Flareboard, \$1800 (SK4054); Express, \$1875 (SK5112); Express, \$1890 (SK5130); Covered Flareboard, \$1825 (SK1023).Autocar Model XXI-F, 1 1/2 ton Panel, \$1875 (SK1025).  
Also Stake, \$1825 (SK4063); Panel, \$1850 (SK3001); Flareboard, \$1825 (SK1119); Coal Body, \$2000 (SK4529); with Power Lift, \$2150; 70 cu. ft. Dump Body, \$2000 (SK7053); with Power Lift, \$2150; Flareboard, \$1800 (SK4054); Express, \$1875 (SK5112); Express, \$1890 (SK5130); Covered Flareboard, \$1825 (SK1023).

Bessemer Model G-1, 1 ton Stake, \$975.

## Commercial Cars

Carburetor	Ignition	Spark-Plug Size	Lubrication	Clutch	Drive	Transmission	Speeds Forward	Type Rear Axle	Front Tires	Rear Tires	Steering Wheel	Brake and Gear Levers	Wheelbase	Engine Starter	% Total Weight on Rear Wheels
R	B	S	SF	C	C	S	3	D	35x3	35x3 1/2	..	C	114	..	67
R	MG	..	F	D	W	S	4	S	..	34x4	L	C	132	..	80
SB	MG	S	S	D	W	S	3	F	34x3	34x3D	..	C	127	..	66
SL	MG	S	F	D	IG	S	3	D	..	..	L	C	120	..	65
SL	MG	S	F	D	IG	S	3	D	..	..	L	C	138	..	65
SL	B	S	SF	C	C	S	3	D	..	..	L	C	128	..	65
SB	..	S	S	D	C	S	3	D	36x3	36x3 1/2	L	C	126	..	75
SB	E	S	S	D	IG	S	3	D	34x3 1/2	34x4	L	C	124	..	70
SB	B	S	F	D	C	S	3	D	36x4*	36x4	R	R	124	..	65
..	B	S	F	D	W	S	3	F	36x4 1/2*	36x4	R	C	124	..	65
SB	B	S	F	D	C	S	3	D	36x4*	36x4	R	R	134	..	65
..	B	S	F	D	W	S	3	F	36x4 1/2*	36x4	R	C	134	..	65
Z	E	S	SF	D	W	S	3	F	36x3	36x4	L	C	120	..	85

## Commercial Cars

SL	B	S	SF	C	C	S	3	D	36x3 1/2	36x4	L	C	124	..	70
SL	B	S	SF	C	C	S	3	D	36x3 1/2	36x4	L	C	140	..	70
SL	B	S	SF	D	W	S	3	S	36x3 1/2	36x5	L	C	124	..	70
SL	B	S	SF	D	W	S	3	S	36x3 1/2	36x5	L	C	140	..	70
Z	B	S	S	D	IG	S	3	F	35x3 1/2	35x4	L	C	128	WS	67

## Commercial Cars

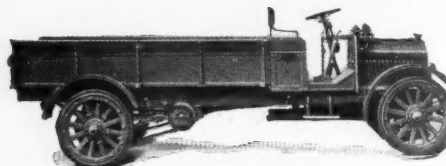
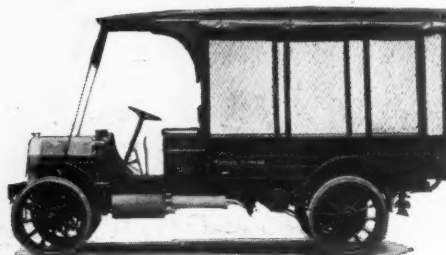
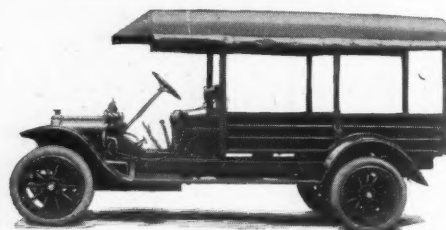
Z	E	1/2	S	D	C	S	3	D	36x3 1/2	36x3 1/2D	L	C	136	..	70
Z	E	1/2	S	D	C	S	3	D	36x3 1/2	36x3 1/2D	L	C	140	..	70
SB	B	S	SF	D	S	P	3	F	34x4	34x5	R	R	97	..	63
SB	B	S	SF	D	S	P	3	F	36x5*	36x5*	R	R	97	..	63
R	B	S	SF	C	C	S	3	D	37x3 1/2	37x5	..	C	136	..	67
SB	B	S	S	D	W	S	3	S	34x4	34x4	L	C	144	..	75
SB	B	1/2	F	D	W	S	3	F	34	34	..	C	132	..	75
Z	B	S	S	D	W	1C	3	S	34x3 1/2	36x5	L	C	130	WS	80
R	B	S	SF	C	W	S	4	F	36x5*	36x5D*	L	C	144	..	60



Lange Model C, 1 1/2 ton Panel, Chassis, \$1750.



Lippard-Stewart Model F, 1 1/2 ton Special Body.

Selden Model JBL, 1 1/2 ton Flareboard, Chassis, \$2000.  
Also Stake, \$2150; Flareboard, \$2125.New York Model L, 1 1/2 ton Screen Side, Chassis, \$1800.  
Made by Tegetmeier & Riepe Co.

White Model TBC, 1 1/2 ton Covered Flareboard, Chassis, \$3000.



Armleder Model HW, 2 ton Covered Flareboard, Chassis, \$2800.

## BODY DETAILS OF CARS NOT ILLUSTRATED

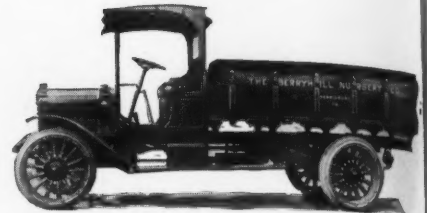
Netco Model C, 1 1/2 ton Panel, \$2350.  
Also Stake, \$2350; Flareboard, \$2350.  
Made by New England Truck Co.

Auglaize Model G, 2 ton Stake, \$1725.  
Also Flareboard, \$1725.

Corbitt Model F, 2 ton Panel, \$2250.  
Also Stake, \$2300; Flareboard, \$2300.



Armleder Model HC, 2 ton Flareboard, Chassis, \$2500.



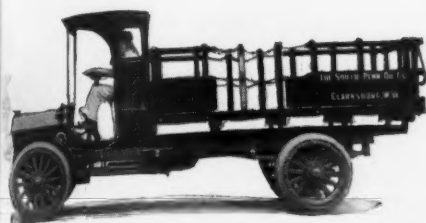
Brockway Model I, 2 ton Flareboard, \$2145.

## 1 1/2 Ton Gasoline

Model	Chassis Weight	Chassis Price	Styles of Stock Bodies Furnished	Height of Loading Platform	Maximum Speed	Horse Power	Cylinders	Bore	Stroke	Cylinders Cast	How Cooled	Radiator	Carburetor
.....	.....	2000	Hurlburt Motor Truck Co., New York City.	18	23	4	3.75	5.5	5.5	4	C	G	C
.....	.....	2000	.....	18	23	4	3.75	5.5	5.5	4	C	G	C
AB	4400	2350	International Motor Co., New York City.	36	16	26	4	4	5	2	C	V	Z
AB	4400	2350	.....	36	16	26	4	4	5	2	C	V	Z
K-31	4075	2000	Kelly-Springfield Motor Truck Co., Springfield, Ohio.	34	16	23	4	3.75	5.25	4	C	C	R
F	4600	.....	Lippard-Stewart Motor Car Co., Buffalo, N. Y.	18	27	4	4.12	5.25	4	C	V	Z	C
F	4600	.....	P, S	18	27	4	4.12	5.25	4	C	V	Z	C
1 1/2	3800	.....	Larrabee-Deyo Motor Truck Co., Inc., Binghamton, N. Y.	14	27	4	4.12	5.25	4	C	T	H	S
C	4200	1750	Lange Motor Truck Co., Pittsburgh, Pa.	42	18	23	4	3.75	5.25	4	T	H	S
C	4450	2250	New England Truck Co., Fitchburg, Mass.	34	15	27	4	4.12	5.25	4	C	T	Z
JBL	3400	2000	Selden Motor Vehicle Co., Rochester, N. Y.	16	23	4	3.75	5.25	4	C	T	S	H
G	3400	.....	Sullivan Motor Car Co., Rochester, N. Y.	34	16	23	4	3.75	4.5	4	T	T	H
L	3750	1800	Tegetmeier & Riepe Co. New York City.	34	18	23	4	3.75	5.25	4	C	H	S
TBC	.....	3000	White Co., Cleveland, Ohio.	23	4	3.75	5.12	4	C	H	S	H	S
B	3600	1800	Warren Motor Truck Co., Warren, Ohio.	18	26	4	4	4.5	2	C	H	S	H
BX	4000	2100	.....	18	26	4	4	4	2	C	H	S	H
B	3600	1800	.....	18	26	4	4	4.5	2	C	H	S	H
BX	4000	2100	.....	18	26	4	4	4	2	C	H	S	H

## 2 Ton Gasoline

.....	4500	2200	Abbott & Downing Co., Concord, N. H.	34	20	30	4	4.25	5.5	4	C	T	H
6C	5100	2375	Atterbury Motor Car Co., Buffalo, N. Y.	15	27	4	4.12	5.25	4	C	T	H	S
HC	4800	2500	O. Armleder Co., Cincinnati, Ohio.	34	15	27	4	4.12	5.25	4	C	H	S
HC	4800	2500	.....	34	15	27	4	4.12	5.25	4	C	H	S
HW	4800	2800	.....	34	15	27	4	4.12	5.25	4	C	H	S
HW	4800	2800	.....	34	15	27	4	4.12	5.25	4	C	H	S
G	1575	.....	Auglaize Motor Car Co., New Bremen, Ohio.	34	12	23	4	3.75	5	4	G	C	C
G	1575	.....	S, FB	34	12	23	4	3.75	5	4	G	C	C
O	4060	2000	H. G. Burford Co., Fremont, Ohio.	34	16	23	4	3.75	5.5	4	C	V	V
O	4060	2000	.....	34	16	23	4	3.75	5.5	4	C	V	V
D	4200	2000	Bessemer Motor Truck Co., Grove City, Pa.	15	27	4	4.12	5.25	4	C	V	V	V
C	4250	2850	Blair Motor Truck Co., Newark, Ohio.	35	12	23	4	3.75	5.75	2	C	C	C
C	4250	2850	P, S, FB	35	12	23	4	3.75	5.75	2	C	C	C
C	4250	2850	P, S, FB	35	12	23	4	3.75	5.75	2	C	C	C
.....	.....	2400	C. L. Barker, Norwalk, Conn.	26	4	4	5	5	5	4	T	H	S
I	4500	1900	Brockway Motor Truck Co., Cortland, N. Y.	36	15	27	4	4.12	5.25	4	C	V	V
I	4500	1900	.....	36	15	27	4	4.12	5.25	4	C	V	V
I	4500	1925	.....	36	15	27	4	4.12	5.25	4	C	V	V
I	4500	1925	.....	36	15	27	4	4.12	5.25	4	C	V	V
K	4500	2125	.....	36	15	27	4	4.12	5.25	4	C	V	V
K	4500	2125	.....	36	15	27	4	4.12	5.25	4	C	V	V
K	4500	2150	.....	36	15	27	4	4.12	5.25	4	C	V	V
K	4500	2150	.....	36	15	27	4	4.12	5.25	4	C	V	V
R	4900	2200	Chase Motor Truck Co., Syracuse, N. Y.	31	18	27	4	4.12	5.25	4	C	T	H
R	4900	2200	P, S, FB	31	18	27	4	4.12	5.25	4	C	T	H
F	4000	2200	Corbitt Automobile Co., Henderson, N. C.	40	12	23	4	3.75	5.5	4	C	T	H
F	4000	2200	P, S, FB	40	12	23	4	3.75	5.5	4	C	T	H
J	4200	.....	Coleman Motor Truck Co., Illion, N. Y.	42	15	26	4	4	5	4	C	T	H
U	.....	2650	Durable Dayton Truck Co., Dayton, Ohio.	16	29	4	4.25	5	2	C	T	H	S
.....	5540	2750	Driggs-Seabury Ordnance Corp., Sharon, Pa.	42	15	30	4	4.33	5.5	2	T	H	S
70	.....	2300	Garford Motor Truck Co., Lima, Ohio.	14	29	4	4.25	5.5	4	C	T	H	S
.....	.....	3000	Hurlburt Motor Truck Co., New York City.	16	27	4	4.12	5.5	5	4	C	T	H
.....	.....	3000	.....	16	27	4	4.12	5.5	5	4	C	T	H



Bessemer Model D, 2 ton Stake Chassis, \$2000.

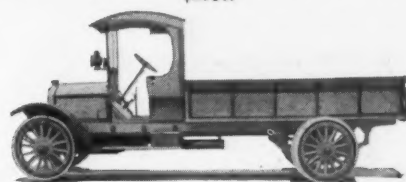


Brockway Model K, 2 ton Stake, \$2295.

## Commercial Cars



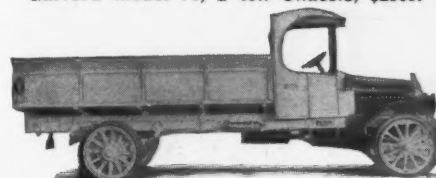
Burford Model O, 2 ton Chassis, \$2000.

Blair Model C, 2 ton Flareboard, Chassis, \$2850.  
Also Panel, \$3155; Stake, \$2980; Flareboard, \$2980.Chase Model R, 2 ton Flareboard, Chassis, \$2200.  
Also Panel, \$2825; Stake, \$2450; Flareboard, \$2375.

Durable Dayton Model U, 2 ton Flareboard, Chassis, \$2650.



Garford Model 70, 2 ton Chassis, \$2300.

Mack Model AB, 2 ton Flareboard, Chassis, \$2700.  
Made by International Motor Co.Sullivan Model G, 1 1/2 ton Canopy Top, \$1775.  
Also Stake, \$1700; Flareboard, \$1700; Flareboard with Cab Top, \$1750.

Radiator	Carburetor	Ignition	Spark-Plug Size	Lubrication	Clutch	Drive	Transmission	Speeds Forward	Type Rear Axle	Front Tires	Rear Tires	Steering Wheel	Brake and Gear Levers	Wheelbase	Engine Starter	% Total Weight on Rear Wheels
		E	..	SF	..	W	S	3	..	34x4	34x5	..	..	120	..	..
		E	..	SF	..	W	S	3	..	34x4	34x5	..	..	136	..	..
3	B	S	S	D	..	W	S	3	F	36	36D	..	C	144	..	71
SB	B	S	S	D	..	W	S	3	F	36	36D	..	C	162	..	71
R	E	S	F	C	..	C	S	3	D	36x3 1/2	36x3D	L	C	144	..	65
V	E	S	SF	C	..	W	S	3	F	36x3 1/2	36x3D	L	C	145	..	72
V	E	S	SF	C	..	W	S	3	F	36x3 1/2	36x3D	L	C	158	..	72
T	B	1/2	SF	D	..	W	S	3	S	36x3 1/2	36x5	L	C	132	..	..
H	MG	S	S	D	..	C	IC	3	D	36x3 1/2	38x4	L	C	125	..	85
T	E	S	S	D	..	W	S	3	F	36x3 1/2	36x5	L	C	144	..	80
T	MG	S	S	D	..	C	S	3	D	36x3 1/2	36x5	..	C	150	..	66
T	H	B	S	SF	C	C	S	3	D	3	4	L	C	129	..	66
H	MG	1/2	S	C	..	C	S	2	D	..	..	R	R	129	..	60
H	MG	S	SF	D	..	B	S	4	S	36x4 1/2*	36x4 1/2D*	L	C	146	..	..
JB	B	S	F	D	..	C	S	3	D	36x4 1/2*	36x5	R	R	134	..	65
SB	B	S	F	D	..	W	S	3	F	37x5*	36x5	R	C	134	..	65
SB	B	S	F	D	..	C	S	3	D	36x4 1/2*	36x5	R	R	144	..	65
..	B	S	F	D	..	W	S	3	F	37x5*	36x5	R	C	144	..	65

## Commercial Cars

..	MG	S	F	D	Abbott & Downing Co., Concord, N. H.	W	S	3	F	36x4	36x4D	R	R	140	WS	70
Z	B	S	S	D	Atterbury Motor Car Co., Buffalo, N. Y.	W	S	4	F	36x4	36x4D	R	R	154	..	65
SL	B	S	S	D	O. Armleder Co., Cincinnati, Ohio.	C	S	3	D	36x4	36x3½D	L	C	148	..	60
SL	B	S	S	D		C	S	3	D	36x4	36x3½D	L	C	166	..	60
SL	B	S	S	D		W	S	3	F	36x4	36x4D	L	C	148	..	60
SL	B	S	S	D		W	S	3	F	36x4	36x4D	L	C	166	..	60
SB	B	½	F	D	Auglaize Motor Car Co., New Bremen, Ohio.	IG	S	3	D	36x4	36x7	L	C	144	D	70
SB	B	½	F	D		IG	S	3	D	36x4	36x4D	L	C	144	D	70
Z	E	S	F	C	H. G. Burford Co., Fremont, Ohio.	IG	S	3	..	36x3½	36x3½D	R	C	132	..	68
Z	E	S	F	C		IG	S	3	..	36x3½	36x3½D	R	C	144	..	68
R	B	S	SF	C	Bessemer Motor Truck Co., Grove City, Pa.	W	S	3	F	37x4	37x3½D	..	C	136	..	67
SL	B	S	SF	C	Blair Motor Truck Co., Newark, Ohio.	W	IC	3	F	34x4	34x3½D	R	R	121	..	71
SL	B	S	SF	C		W	IC	3	F	34x4	34x3½D	R	R	135	..	71
SL	B	S	SF	C		W	IC	3	F	34x4	34x3½D	R	R	144	..	71
SB	E	S	..	D	C. L. Barker, Norwalk, Conn.	W	S	4	S	36x4	36x7	L	C	136	..	80
SL	B	S	SF	C	Brockway Motor Truck Co., Cortland, N. Y.	C	S	3	D	36x4	36x6	L	C	140	..	70
SL	B	S	SF	C		C	S	3	D	36x4	36x3½D	L	C	140	..	70
SL	B	S	SF	C		C	S	3	D	36x4	36x6	L	C	156	..	70
SL	B	S	SF	C		C	S	3	D	36x4	36x3½D	L	C	156	..	70
SL	B	S	SF	D		W	S	3	S	36x4	36x6	L	C	140	..	70
SL	B	S	SF	D		W	S	3	S	36x4	36x3½D	L	C	140	..	70
SL	B	S	SF	D		W	S	3	S	36x4	36x6	L	C	156	..	70
SL	B	S	SF	D		W	S	3	S	36x4	36x3½D	L	C	156	..	70
H	B	S	SF	D	Chase Motor Truck Co., Syracuse, N. Y.	W	S	3	S	..	..	R	C	160	..	59
H	B	S	SF	D		W	S	3	S	..	..	R	C	146	..	59
SB	E	S	SF	D	Corbitt Automobile Co., Henderson, N. C.	W	S	3	..	36x3½	40x3½D	L	C	130	..	75
SB	E	S	SF	D		W	S	3	..	36x3½	40x3½D	L	C	154	..	75
SL	B	S	F	D	Coleman Motor Truck Co., Illion, N. Y.	W	S	3	S	36x4	36x3½D	R	R	132	..	..
SB	B	S	SF	D	Durable Dayton Truck Co., Dayton, Ohio.	C	S	3	D	36x4	36x4D	L	C	119	..	58
SB	R	M	S	C	Driggs-Seabury Ordnance Corp., Sharon, Pa.	C	S	3	D	36x4	34x3½D	R	R	150	..	70
R	SD	..	S	D	Garford Motor Truck Co., Lima, Ohio.	W	S	3	F	36x4	36x4D	C	C	142	..	..
..	E	..	SF	..	Hurlburt Motor Truck Co., New York City.	W	S	3	..	36x4	36x4D	..	..	148	..	..
..	E	..	SF	..		W	S	3	..	36x4	36x4D	..	..	170	..	..



Mack Model AB, 2 ton Panel, Chassis, \$2700.  
Made by International Motor Co.



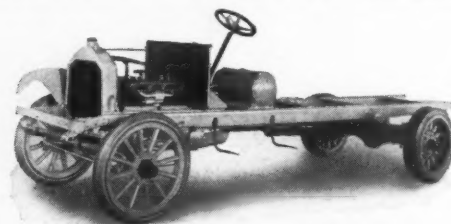
Adams Model E, 2 1/2 ton Tank Body, \$2600.  
Also Panel, \$2800; Stake, \$2625; Flareboard,  
\$2675; Dump, \$2800.



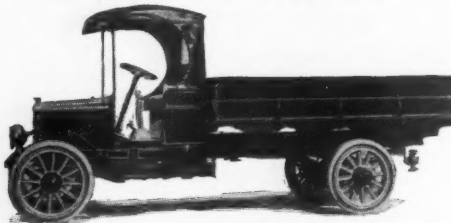
Schacht 2 ton Panel, Chassis, \$2800.



Lippard-Stewart Model G, 2 ton Tank Body.



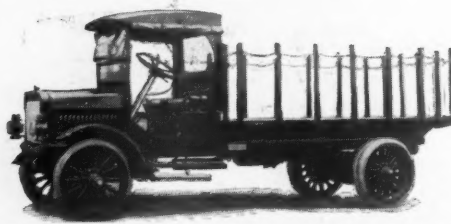
Maccar Model H, 2 ton Chassis, \$2600.



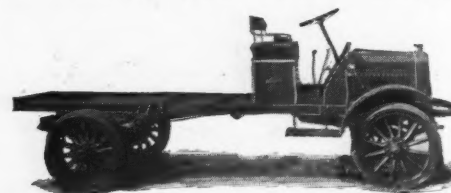
Netco Model D, 2 ton Flareboard, \$2450.  
Also Panel, \$2450; Stake, \$2450.  
Made by New England Truck Co.



Lange Model B, 2 1/2 ton Special Stake, Chassis,  
\$2350.



Gramm-Bernstein 2 1/2 ton Stake, Chassis, \$2600.



Rowe Model CDW, 2 ton Chassis, \$2800.

## 2 Ton Gasoline

Model	Chassis Weight	Chassis Price	Styles of Stock Bodies Furnished	Height of Loading Platform	Maximum Speed	Horse Power	Cylinders	Bore	Stroke	Cylinders Cast	How Cooled	radiator	Carburetor
AB	4600	2700	International Motor Co., New York City.	36	16	26	4	4	5	2	C	SB	SB
AB	4600	2700	.....	36	16	26	4	4	5	2	C	SB	SB
H	3900	2450	Krebs Commercial Car Co., Clyde, Ohio.	33	15	27	4	4.12	5.25	4	C	SL	SL
H	3900	2450	P, S, FB	33	15	27	4	4.12	5.25	4	C	SL	SL
16-2	....	2200	Knickerbocker Motor Truck Mfg. Co., New York City.	38	14	27	4	4.12	5.25	2	C	SB	SB
G	4850	....	Lippard-Stewart Motor Car Co., Buffalo, N. Y.	..	15	27	4	4.12	5.25	4	C	Z	Z
G	4850	....	P, S	..	15	27	4	4.12	5.25	4	C	Z	Z
H	5000	2600	Maccar Truck Co., Scranton, Pa.	38	14	32	4	4.5	5.5	2	C	H	H
J	5500	2600	.....	38	14	32	4	4.5	5.5	2	C	H	H
H	5000	2600	.....	38	14	32	4	4.5	5.5	2	C	H	H
J	5500	2600	.....	38	14	32	4	4.5	5.5	2	C	H	H
D	4650	2350	New England Truck Co., Fitchburg, Mass.	34	15	27	4	4.12	5.25	4	C	Z	Z
.....	....	3000	P, S, FB	..	17	32	4	4.5	6.5	2	G	T	S
X-3	6200	3000	Peerless Motor Car Co., Cleveland, Ohio.	..	17	32	4	4.5	6.5	2	G	T	S
X-3	6200	3000	Pierce-Arrow Motor Car Co., Buffalo, N. Y.	42	16	26	4	4	5.5	2	C	T	T
CDW	....	2800	.....	42	16	26	4	4	5.5	2	C	T	T
JWL	3600	2250	Rowe Motor Mfg. Co., Downingtown, Pa.	..	15	..	4	5	..	..	C	H	H
JC	3400	2000	.....	..	13	27	4	4.12	5.25	4	C	V	S
JWL	3600	2250	Selden Motor Vehicle Co., Rochester, N. Y.	..	13	23	4	3.75	5.25	4	C	V	S
JC	3400	2000	.....	..	13	23	4	4.12	5.25	4	C	V	S
M	3950	1910	.....	..	13	23	4	3.75	5.25	4	C	V	S
M	3950	1910	Sanford Motor Truck Co., Syracuse, N. Y.	37	14	..	4	4.75	5.25	2	C	T	S
.....	5000	2800	P, S, FB	37	14	..	4	4.75	5.25	2	C	T	S
E	4000	....	G. A. Schacht Motor Truck Co., Cincinnati, Ohio.	42	15	29	4	4.25	4.25	4	C	C	C
M	4900	2600	P	42	15	29	4	4.25	4.25	4	C	C	C
H	5500	2250	Sullivan Motor Car Co., Rochester, N. Y.	30	14	28	4	4.12	5.5	4	C	T	T
H	5500	2250	S, FB	30	14	28	4	4.12	5.5	4	C	T	T
H	5200	2200	Tiffin Wagon Co., Tiffin, Ohio.	37	13	27	4	4.12	5.25	4	C	V	V
E	....	2550	.....	37	13	27	4	4.12	5.25	4	C	V	V
C	3600	1800	Trabold Truck Mfg. Co., Johnstown, Pa.	38	15	29	4	4.25	5.5	4	..	H	H
C	4200	2000	P, S, FB	38	15	29	4	4.25	5.5	4	..	H	H
BXS	4800	2250	P, S, FB	38	15	29	4	4.25	5.5	4	..	H	H
BXS	4800	2250	.....	38	15	29	4	4.25	5.5	4	..	H	H
WD-2-16	....	2250	United States Motor Truck Co., Cincinnati, Ohio.	42	15	27	4	4.12	5.25	4	C	H	H
EC	6000	2800	.....	..	27	4	4.13	5.25	..	..	C	..	..
EC	6000	2800	E. G. Willingham's Sons, Atlanta, Ga.	38	15	23	4	3.75	5	4	C	C	C
E	4120	2500	.....	38	15	23	4	3.75	5	4	C	C	C
E	4120	2500	Warren Motor Truck Co., Warren, Ohio.	..	17	26	4	4	4.5	2	C	H	H
DF	4200	2250	.....	..	18	29	4	4.25	5.5	4	C	H	H
66	....	1800	.....	..	17	26	4	4	4.5	2	C	H	H
.....	5500	2600	.....	..	18	29	4	4.25	5.5	4	C	H	H

## 2 1/4 Ton Gasoline

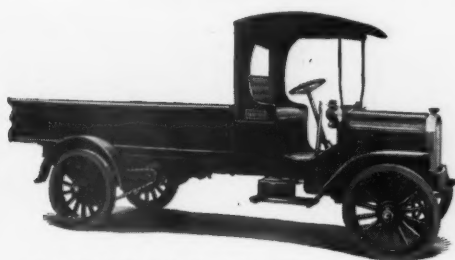
Witt-Will Co., Inc., Washington, D. C.	36	15	27	4	4.12	5.25	4	C	T
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## 2 1/2 Ton Gasoline

O. Armleder Co., Cincinnati, Ohio.	34	14	27	4	4.12	5.25	4	C	H
.....	34	14	27	4	4.12	5.25	4	C	H
Adams Truck, Fdy. & Mch. Co., Findlay, Ohio.	40	18	27	4	4.12	5.25	4	C	T
D, P, S, FB	40	18	27	4	4.12	5.25	4	C	T
Chester County Motor Co., Coatesville, Pa.	42	15	27	4	4.12	5.25	4	W	T
.....	42	15	27	4	4.12	5.25	4	W	T
Garford Motor Truck Co., Lima, Ohio.	..	14	23	4	3.75	5.5	4	C	C
Gramm-Bernstein Co., Lima, Ohio.	40	14	29	4	4.25	5.75	2	C	T



Brinton Model DF, 2 1/2 ton Flareboard, Chassis, \$2250.  
Made by Chester County Motor Co.



Sanford Model M, 2 ton Flareboard, \$2000.  
Also Stake, \$2000.



Trabold Model H, 2 ton Covered Flareboard, Chassis, \$2250.  
Also Panel, \$2375; Stake, \$2325; Flareboard, \$2310.

### Commercial Cars

Indicator	Carburetor	Ignition	Spark-Plug Size	Lubrication	Clutch	Drive	Transmission	Speeds Forward	Type Rear Axle	Front Tires	Rear Tires	Steering Wheel	Brake and Gear Levers	Wheelbase	Engine Starter	% Total Weight on Rear Wheels
International Motor Co., New York City.																
SB	B	S	S	D	W	S	3	F	36	36D	..	C	144	..	71	
SB	B	S	S	D	W	S	3	F	36	36D	..	C	162	..	71	
Krebs Commercial Car Co., Clyde, Ohio.																
SL	MG	S	S	C	W	S	4	F	36x4	36x6	L	C	144	..	..	
SL	MG	S	S	C	W	S	4	F	36x4	36x6	L	C	162	..	..	
Knickerbocker Motor Truck Mfg. Co., New York City.																
SB	B	S	F	D	W	S	3	F	36x4	36x4D	L	C	148	..	85	
Lippard-Stewart Motor Car Co., Buffalo, N. Y.																
Z	E	S	SF	C	W	S	3	F	36x4	36x4D	L	C	158	..	69	
Z	E	S	SF	C	W	S	3	F	36x4	36x4D	L	C	165	..	69	
Maccar Truck Co., Scranton, Pa.																
..	MG	S	F	D	W	S	3	F	36x4	36x4D	L	C	150	..	65	
..	MG	S	F	D	C	S	3	D	36x4	36x4D	L	C	162	..	65	
..	MG	S	F	D	W	S	3	F	36x4	36x4D	L	C	150	..	65	
..	MG	S	F	D	C	S	3	D	36x4	36x4D	L	C	162	..	65	
New England Truck Co., Fitchburg, Mass.																
Z	E	S	S	D	W	S	3	F	36x4	36x6	L	C	144	..	60	
Peerless Motor Car Co., Cleveland, Ohio.																
SB	R	..	S	C	W	S	3	S	36x4	36x4D	R	R	145	..	..	
Pierce-Arrow Motor Car Co., Buffalo, N. Y.																
..	B	S	F	C	W	S	3	F	36x4	36x4D	R	R	150	..	..	
..	B	S	F	C	W	S	3	F	36x4	36x4D	R	R	180	..	..	
Rowe Motor Mfg. Co., Downingtown, Pa.																
R	MG	..	F	D	W	S	4	F	..	36x3½D	L	C	142	..	80	
Selden Motor Vehicle Co., Rochester, N. Y.																
SB	MG	S	S	D	W	S	3	F	36x4	36x6	..	C	150	..	66	
SB	MG	S	S	D	IG	S	3	D	36x4	36x6	..	C	150	..	66	
SB	MG	S	S	D	W	S	3	F	36x4	36x3D	..	C	150	..	66	
SB	MG	S	S	D	IG	S	3	D	36x4	36x3D	..	C	150	..	66	
Sanford Motor Truck Co., Syracuse, N. Y.																
SL	MG	S	F	D	IG	S	3	D	..	..	L	C	140	..	65	
SL	MG	S	F	D	C	S	3	D	..	..	L	C	140	..	65	
G. A. Schacht Motor Truck Co., Cincinnati, Ohio.																
C	SL	E	SF	C	W	S	3	F	38x3½	40x3½D	L	C	144	..	80	
Sullivan Motor Car Co., Rochester, N. Y.																
T	H	B	SF	D	W	S	3	F	4	6	L	C	150	..	75	
Tiffin Wagon Co., Tiffin, Ohio.																
V	SL	B	SF	C	C	S	3	D	..	D	L	C	140	..	65	
Trabold Truck Mfg. Co., Johnstown, Pa.																
H	SB	..	S	D	W	S	3	F	36x4	36x3½D	L	C	130	..	75	
H	SB	..	S	D	W	S	3	F	36x4	36x3½D	L	C	140	..	75	
United States Motor Truck Co., Cincinnati, Ohio.																
..	SB	B	½	S	C	W	IC	3	S	34x4	36x4D	R	C	138	..	80
..	SB	B	½	..	C	C	IC	3	D	3½	3½D	L	C	132	..	75
E. G. Willingham's Sons, Atlanta, Ga.																
C	SB	E	S	F	D	IG	S	3	D	36x4	36x6	L	C	144	..	70
Warren Motor Truck Co., Warren, Ohio.																
H	SB	B	S	F	D	C	S	3	D	37x5*	36x6	R	R	144	..	65
H	SB	B	S	F	D	W	S	3	F	37x5*	36x3½D	R	C	148	..	65
H	SB	B	S	F	D	C	S	3	D	37x5*	36x6	R	R	148	..	65
H	SB	B	S	F	D	W	S	3	F	37x5*	36x3½D	R	C	152	..	65

### Commercial Cars

Witt-Will Co., Inc., Washington, D. C.  
W S 3 F 36x3 1/2 36x3 1/2 D L C 144 .. 85

### Commercial Cars

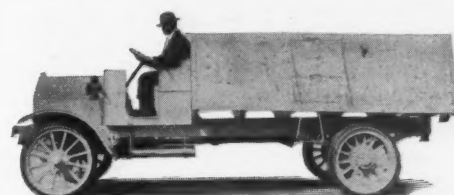
O. Armleder Co., Cincinnati, Ohio.  
C S 3 D 36x4 36x4D L C 148 .. 60  
C S 3 D 36x4 36x4D L C 166 .. 60

Adams Truck, Fdy. & Mch. Co., Findlay, Ohio.  
C S 3 D 36x3 1/2 36x3 1/2 D L C 136 .. 70  
C S 3 D 36x3 1/2 36x3 1/2 D L C 140 .. 70

Chester County Motor Co., Coatesville, Pa.  
W S 3 F 36 36 .. C 138 .. 75

Garford Motor Truck Co., Lima, Ohio.  
W S 3 F 36x3 1/2 36x5 .. C 142 .. ..

Gramm-Bernstein Co., Lima, Ohio.  
W IC 3 S 36x4 36x4D L C 156 WS 80



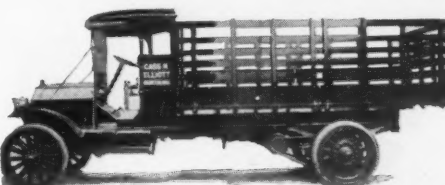
Witt-Will Model WD-2-16, 2 1/4 ton Special Body, Chassis, \$2250.



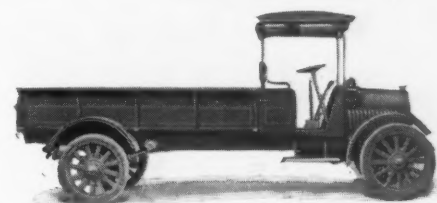
Pierce-Arrow Model X-3, 2 ton Stake, Chassis, \$3000.



Maccar Model J, 2 ton Chassis, \$2600.



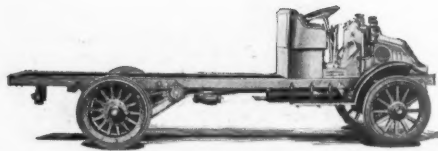
Armleder Model EC, 2 1/2 ton Slat Side Stake, Chassis, \$2800.



Sullivan Model E, 2 ton Express Cab, \$2400.  
Also Stake, \$2350; Flareboard, \$2350; Express with Canopy Top, \$2450.



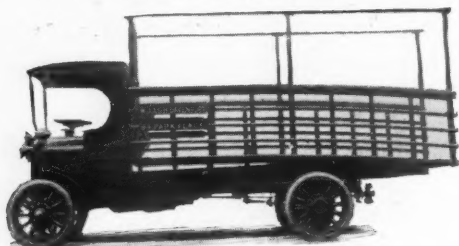
Selden Model JWL, 2 ton Flareboard, Chassis, \$2250.  
Also Stake, \$2400; Flareboard, \$2375.



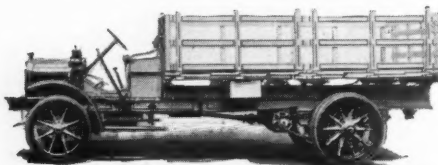
Kelly-Springfield Model K-35, 2 1/2 ton Chassis, \$2750.



United States Model E, 2 ton Covered Flareboard, Chassis, \$2550.



Blair Model D, 3 ton Special Stake, Chassis, \$3250.  
Also Panel, \$3565; Stake, \$3385; Flareboard, \$3385.



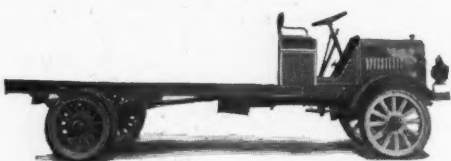
White Model TAD, 3 ton Special Body, Chassis, \$3700.



Armleder Model KW, 3 1/2 ton Stake, \$3600.



Locomobile Model B, 3 ton Dump, Chassis, \$3500.

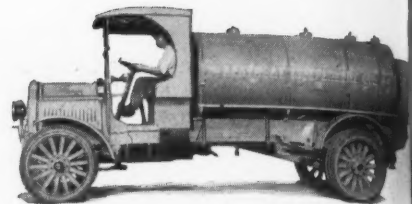


Rowe Model DEW, 3 ton Chassis, \$3400.

BODY DETAILS OF CARS NOT ILLUSTRATED  
Crawford 3 ton Panel, \$3350.  
Also Stake, \$3250; Flareboard, \$3325.



Locomobile Model B, 3 ton Stake, Chassis, \$3500.



Schacht 3 ton Tank, Chassis, \$3200.

## 2 1/2 Ton Gasoline

Model	Chassis Weight	Chassis Price	Styles of Stock Bodies Furnished	Height of Loading Platform	Maximum Speed	Horse Power	Cylinders	Bore	Stroke	Cylinders Cast	How Cooled
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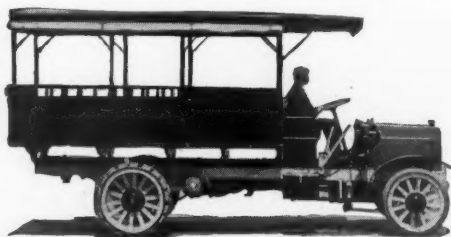
K-35	4950	2750	Kelly-Springfield Motor Truck Co., Springfield, Ohio.	34	14	23	4	3.75	5.25	4	C
			Larrabee-Deyo Motor Truck Co., Inc., Binghamton, N. Y.								
2	4400	....	.....	..	14	27	4	4.12	5.25	4	C
2	4400	....	.....	..	14	27	4	4.12	5.25	4	C
2	4400	....	.....	..	14	27	4	4.12	5.25	4	C
2	4400	....	.....	..	14	27	4	4.12	5.25	4	C
			Lange Motor Truck Co., Pittsburgh, Pa.								
B	5400	2350	.....	44	15	27	4	4.12	5.25	4	C
			United States Motor Truck Co., Cincinnati, Ohio.								
G	....	2750	.....	..	..	27	4	4.13	5.25		C

## 3 Ton Gasoline

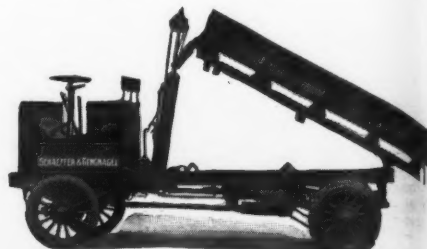
D	5275	3250	Blair Motor Truck Co., Newark, Ohio.	39	12	29	4	4.25	5.75	2	C
D	5275	3250	P. S. FB	39	12	29	4	4.25	5.75	2	C
D	5275	3250	P. S. FB	39	12	29	4	4.25	5.75	2	C
.....	5000	3100	Crawford Automobile Co., Hagerstown, Md.	42	12	32	4	4.5	5.5	2	C
H	6200	....	Coleman Motor Truck Co., Ilion, N. Y.	44	12	36	4	4.75	5.5	1	C
.....	6075	3250	Driggs-Seabury Ordnance Corp., Sharon, Pa.	42	15	30	4	4.33	5.5	2	T
I	5400	3100	Krebs Commercial Car Co., Clyde, Ohio.	34	13	27	4	4.12	5.25	4	C
I	5400	3100	P. S. FB	34	13	27	4	4.12	5.25	4	C
B	6500	3500	Locomobile Co. of America, Bridgeport, Conn.	33	12	29	4	4.25	6	2	C
.....	8040	....	Morton Truck & Tractor Co., Harrisburg, Pa.	51	26	36	4	4.75	6.75	2	C
.....	....	3700	Peerless Motor Car Co., Cleveland, Ohio.	32	4	4.5	6.5	....	....	....	C
DEW	....	3400	Rowe Motor Mfg. Co., Downingtown, Pa.	12	....	4.25	5	2	....	....	C
.....	5700	3200	G. A. Schacht Motor Truck Co., Cincinnati, Ohio.	43	12	48	4	5.5	5.5	4	C
D	....	3200	P	32	4	4.5	5.5	....	....	....	C
TAD	....	3700	United States Motor Truck Co., Cincinnati, Ohio.	32	4	4.5	5.5	....	....	....	C
.....	....	3700	White Co., Cleveland, Ohio.	23	4	3.75	5.12	4	....	....	C

## 3 1/2 Ton Gasoline

6D	6360	3175	Atterbury Motor Car Co., Buffalo, N. Y.	17	32	4	4.5	5.5	2	....	C
KW	6500	3500	O. Armleder Co., Cincinnati, Ohio.	36	13	32	4	4.5	5.5	2	C
KW	6500	3500	.....	36	13	32	4	4.5	5.5	2	C
D	7200	....	H. G. Burford Co., Fremont, Ohio.	36	13	32	4	4.5	6.75	4	C
E	6100	2800	Bessemer Motor Truck Co., Grove City, Pa.	12	32	4	4.5	5.5	2	....	C
O	6200	3300	Chase Motor Truck Co., Syracuse, N. Y.	31	14	32	4	4.5	5.5	2	C
O	6200	3300	P. S. FB	31	14	32	4	4.5	5.5	2	C
A	....	3400	Durable Dayton Truck Co., Dayton, Ohio.	12	36	4	4.75	5.5	2	....	C
.....	6500	3400	Gramm-Bernstein Co., Lima, Ohio.	42	12	29	4	4.25	5.75	2	C
.....	....	3500	Hurlburt Motor Truck Co., New York City.	13	29	4	4.25	5.5	....	....	C
.....	....	3500	.....	13	29	4	4.25	5.5	....	....	C
AC	8000	3400	International Motor Co., New York City.	39	16	40	4	5	6	2	C
AC	8000	3400	.....	39	16	40	4	5	6	2	C
AC	8000	3400	.....	39	16	40	4	5	6	2	C



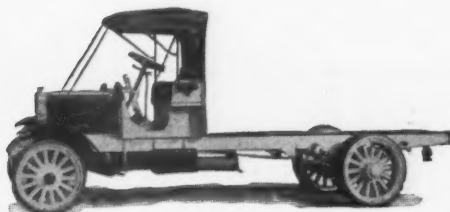
Peerless 3 ton Covered Express, Chassis, \$3700.



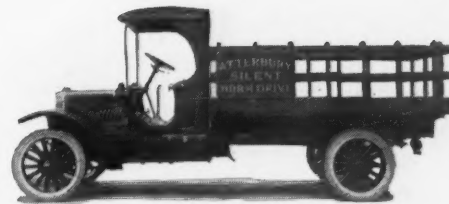
Durable Dayton Model A, 3 1/2 ton Dump, Chassis, \$3400.



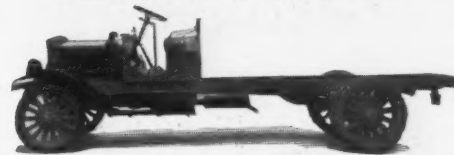
Bessemer Model E, 3 1/2 ton Dump Body, Chassis, \$2800.



Atterbury Model 6D, 3 1/2 ton Chassis.



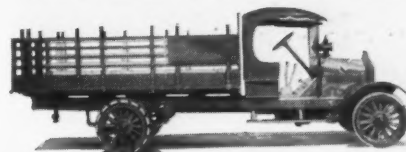
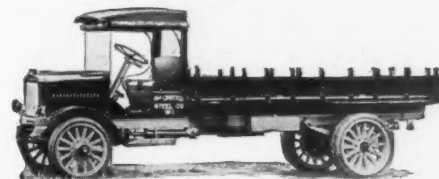
Atterbury Model 6D, 3 1/2 ton Stake.



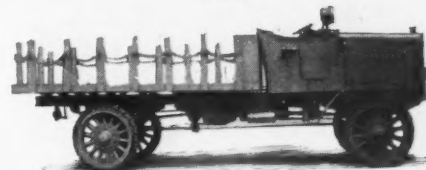
Atterbury Model 6D, 3 1/2 ton Chassis.



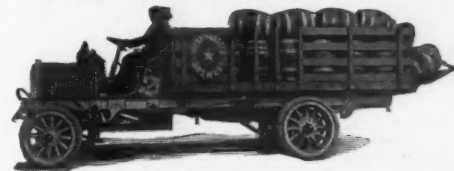
Burford Model D, 3 1/2 ton War Body.

Chase Model O, 3 1/2 ton Slat Side Stake, Chassis, \$3300.  
Also Panel, \$4050; Stake, \$3600; Flareboard, \$3550.

Gramm-Bernstein 3 1/2 ton Sided Stake, Chassis, \$3400.



Morton Four Wheel Drive, 3 ton Stake.



United States Model D, 3 ton Stake, Chassis, \$3200.

Mack Model AC, 3 1/2 ton Covered Box, Chassis, \$3400.  
Made by International Motor Co.

## Commercial Cars

Character	Ignition	Spark-Plug Size	Lubrication	Clutch	Drive	Transmission	Speeds Forward	Type Rear Axle	Front Tires	Rear Tires	Steering Wheel	Brake and Gear Levers	Wheelbase	Engine Starter	% Total Weight on Rear Wheels
R	E	S	F	C	C	S	3	D	36x4	36x4D	L	C	144	..	65
B	B	1/2	SF	D	W	S	3	S	36x4	36x6	L	C	140	..	75
B	B	1/2	SF	D	W	S	3	S	36x4	36x3 1/2 D	L	C	140	..	75
B	B	1/2	SF	D	W	S	3	S	36x4	36x6	L	C	148	..	75
B	B	1/2	SF	D	W	S	3	S	36x4	36x3 1/2 D	L	C	148	..	75
SB	MG	S	S	D	C	IC	3	D	36x4	38x6	L	C	136	..	85
SB	B	S	..	C	C	IC	3	D	4	3 1/2 D	L	C	138	..	75

## Commercial Cars

Kelly-Springfield Motor Truck Co., Springfield, Ohio.

Larrabee-Deyo Motor Truck Co., Inc., Binghamton, N. Y.

Lange Motor Truck Co., Pittsburgh, Pa.

United States Motor Truck Co., Cincinnati, Ohio.

## Commercial Cars

Blair Motor Truck Co., Newark, Ohio.

Crawford Automobile Co., Hagerstown, Md.

Coleman Motor Truck Co., Illion, N. Y.

Driggs-Seabury Ordnance Corp., Sharon, Pa.

Krebs Commercial Car Co., Clyde, Ohio.

Locomotive Co. of America, Bridgeport, Conn.

Morton Truck &amp; Tractor Co., Harrisburg, Pa.

Peerless Motor Car Co., Cleveland, Ohio.

Rowe Motor Mfg. Co., Downingtown, Pa.

G. A. Schacht Motor Truck Co., Cincinnati, Ohio.

United States Motor Truck Co., Cincinnati, Ohio.

White Co., Cleveland, Ohio.

## Commercial Cars

Atterbury Motor Car Co., Buffalo, N. Y.

O. Armleder Co., Cincinnati, Ohio.

H. G. Burford Co., Fremont, Ohio.

Bessemer Motor Truck Co., Grove City, Pa.

Chase Motor Truck Co., Syracuse, N. Y.

Durable Dayton Truck Co., Dayton, Ohio.

Gramm-Bernstein Co., Lima, Ohio.

Hurlburt Motor Truck Co., New York City.

International Motor Co., New York City.

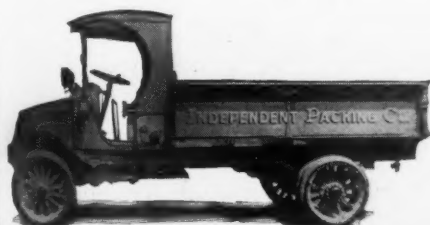
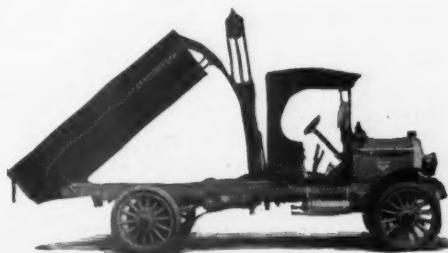
Krebs Model I, 3 ton Flareboard, \$3300.

Also Panel, \$3325; Stake, \$3300.

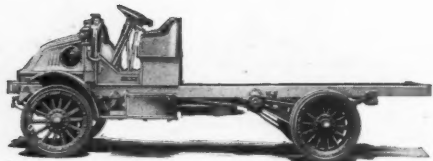
Lange Model B, 2 1/2 ton Dump, Chassis, \$2350.

Mack Model AC, 3 1/2 ton Covered Box, Chassis, \$3400.

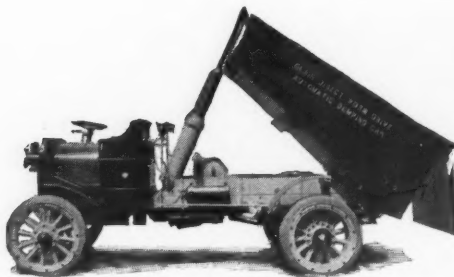
Made by International Motor Co.

Krebs Model I, 3 ton Flareboard, \$3300.  
Also Panel, \$3325; Stake, \$3300.

Lange Model B, 2 1/2 ton Dump, Chassis, \$2350.



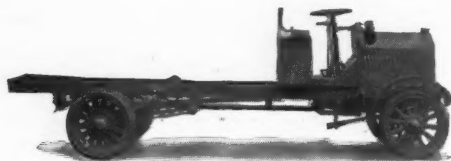
Kelly-Springfield Model K-40, 3 1/2 ton Chassis, \$3400.



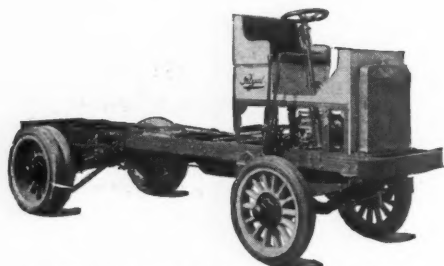
Blair Model F, 5 ton Dump, Chassis, \$4500.



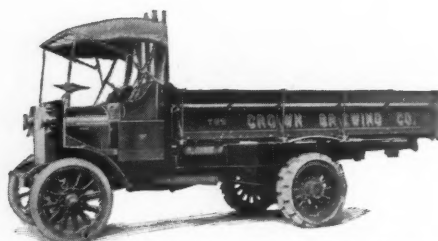
Peerless 4 ton Special Body, Chassis, \$4000.



Selden Model N, 3 1/2 ton Chassis, \$2950.



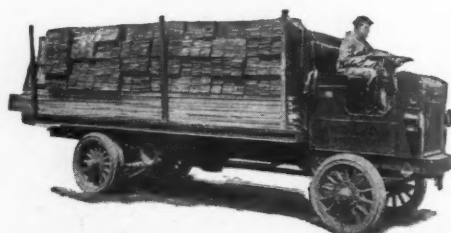
Royal Model A-5, 5 ton Chassis, \$4500.



Blair Model E, 4 ton Flareboard, Chassis, \$3750.



Locomobile Model BB, 4 ton Dump, Chassis, \$3650.



Durable Dayton Model B, 5 ton Stake, Chassis, \$4500.

### 3 1/2 Ton Gasoline

Model	Chassis Weight	Chassis Price	Styles of Stock Bodies Furnished	Height of Loading Platform	Maximum Speed	Horse Power	Cylinders	Bore	Stroke	Cylinders Cast	How Cooled	Carburetor
K-40	7990	3400	Kelly-Springfield Motor Truck Co., Springfield, Ohio.	40	10	32	4	4.5	6.5	2	C	
.....	6500	2600	A. R. King Mfg. Co., Kingston, N. Y.	42	12	32	4	4.5	5.5	2	C	
16-3 1/2	....	2850	Knickerbocker Motor Truck Mfg. Co., New York City.	38	12	34	4	4.5	5.5	2	C	
M	6050	3250	Maccar Truck Co., Scranton, Pa.	38	11	32	4	4.5	5.5	2	C	
O	6500	3250	.....	38	11	32	4	4.5	5.5	2	C	
M	6050	3250	.....	38	11	32	4	4.5	5.5	2	C	
O	6500	3250	.....	38	11	32	4	4.5	5.5	2	C	
A-3 1/2	7500	3500	Royal Motor Truck Co. of N. Y., New York City.	34	15	29	4	4.25	5	2	W	
A-3 1/2	7500	3500	.....	34	15	29	4	4.25	5	2	W	
N	6330	2950	Selden Motor Vehicle Co., Rochester, N. Y.	..	13	32	4	4.5	5.5	2	C	
J	6500	2800	United States Motor Truck Co., Cincinnati, Ohio.	44	12	32	4	4.5	5.5	2	C	

### 4 Ton Gasoline

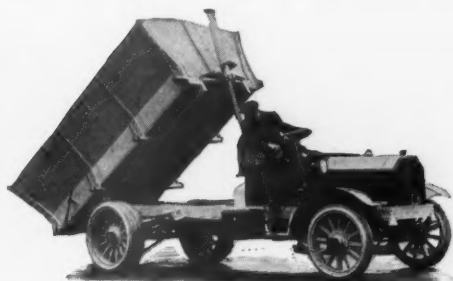
E	7900	3750	Blair Motor Truck Co., Newark, Ohio.	40	12	32	4	4.5	6.75	2	C	
K-45	8150	3600	P. S, FB	40	8	32	4	4.5	6.5	2	C	
BB	7070	3650	Kelly-Springfield Motor Truck Co., Springfield, Ohio.	40	8	32	4	4.5	6.5	2	C	
.....	4000		Locomobile Co. of America, Bridgeport, Conn.	33	14	29	4	4.25	6	2	C	
F	3500		Peerless Motor Car Co., Cleveland, Ohio.	..	..	32	4	4.5	6.5	..	C	
			United States Motor Truck Co., Cincinnati, Ohio.	..	..	32	4	4.5	5.5	..	C	

### 5 Ton Gasoline

F	8150	4500	Blair Motor Truck Co., Newark, Ohio.	40	12	32	4	4.5	6.75	2	C	
B	4500		P. S, FB	40	12	32	4	4.5	6.75	2	C	
.....	7500	4500	Durable Dayton Truck Co., Dayton, Ohio.	..	11	36	4	4.75	5.5	2	C	
D	4300		Driggs-Seabury Ordnance Corp., Sharon, Pa.	45	10	30	4	4.33	5.5	2	T	
.....	5900	4800	Garford Motor Truck Co., Lima, Ohio.	..	8	36	4	4.75	5.5	2	W	
K-50	8300	4250	International Motor Co., New York City.	30	13	31	4	4.37	5.5	2	C	
R-5	7700	4500	Kelly-Springfield Motor Truck Co., Springfield, Ohio.	39	7	32	4	4.5	6.5	2	C	
R-5	7700	4500	Pierce-Arrow Motor Car Co., Buffalo, N. Y.	46	14	38	4	4.87	6	2	C	
.....	4500		.....	46	14	38	4	4.87	6	2	C	
GW	4500		Peerless Motor Car Co., Cleveland, Ohio.	..	..	32	4	4.5	6.5	..	C	
A-5	10500	4500	Rowe Motor Mfg. Co., Downingtown, Pa.	..	10	..	..	4.75	5.5	2	C	
A-5	10500	4500	.....	34	12	36	4	4.75	5.5	2	W	
A-5	10500	4500	Royal Motor Truck Co. of N. Y., New York City.	34	12	36	4	4.75	5.5	2	W	
A-5	10500	4500	.....	34	12	36	4	4.75	5.5	2	W	
A-5	10500	4500	.....	34	12	36	4	4.75	5.5	2	W	



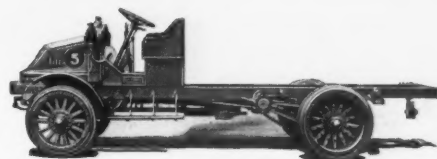
Garford Model D, 5 ton Chassis, \$4300.



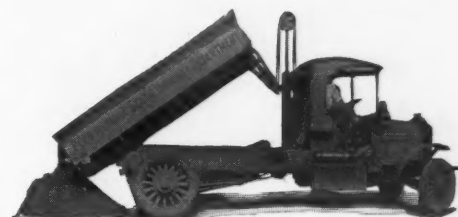
Peerless 5 ton Dump, Chassis, \$4500.



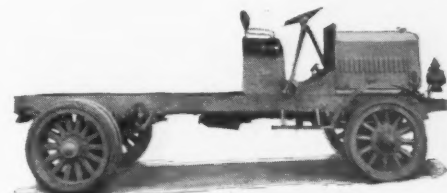
Locomobile Model BB, 4 ton Lumber Body, Chassis, \$3650.



Kelly-Springfield Model K-50, 5 ton Chassis, \$4250.



Pierce-Arrow Model R-5, 5 ton Dump, Chassis, \$4500.

Saurer 5 ton Dump, Chassis, \$4800.  
Made by International Motor Co.

Rowe Model GW, 5 ton Chassis, \$4500.



United States Model J, 3 1/2 ton Chassis, \$2800.

## Commercial Cars

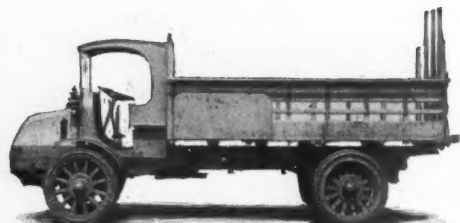
Model	Carburetor	Ignition	Spark-Plug Size	Lubrication	Clutch	Drive	Transmission	Speeds Forward	Type Rear Axle	Front Tires	Rear Tires	Steering Wheel	Brake and Gear Levers	Wheelbase	Engine Starter	% Total Weight on Rear Wheels	
R	E	S	F	C	C	S	3	D	36x5	40x5D	L	C	150	..	65		
Kelly-Springfield Motor Truck Co., Springfield, Ohio.																	
SL	B	S	SF	D	A.	R.	King Mfg. Co., Kingston, N. Y.	C	IC	3	D	36x5D	R	R	120	..	65
SB	B	S	F	D	Knickerbocker Motor Truck Mfg. Co., New York City.	W	S	3	F	36x5	36x5D	L	C	164	..	85	
Maccar Truck Co., Scranton, Pa.																	
..	MG	S	F	D	W	S	3	F	36x5	36x5D	L	C	162	..	65		
..	MG	S	F	D	C	S	3	D	36x5	36x5D	L	C	162	..	65		
..	MG	S	F	D	W	S	3	F	36x5	36x5D	L	C	174	..	65		
..	MG	S	F	D	C	S	3	D	36x5	36x5D	L	C	174	..	65		
Royal Motor Truck Co. of N. Y., New York City.																	
SB	B	S	F	D	W	IC	3	..	.....	D	R	R	148	..	75		
SB	B	S	F	D	W	IC	3	..	.....	D	R	R	150	..	75		
Selden Motor Vehicle Co., Rochester, N. Y.																	
SB	MG	S	S	D	W	S	4	F	36x5	36x5D	..	C	164	..	66		
United States Motor Truck Co., Cincinnati, Ohio.																	
SB	B	1/2	S	C	W	IC	3	S	36x5	40x5D	R	C	162	..	80		

## Commercial Cars

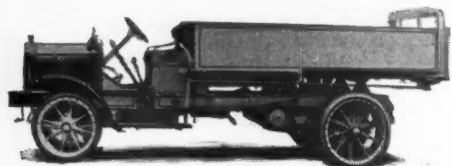
SL	B	S	SF	C	W	IC	3	F	36x5	36x5D	R	R	144	..	75
R	E	S	F	C	C	S	3	D	36x5	40x6D	L	C	150	..	65
L	MG	S	SF	C	W	S	4	F	36x5	36x6	R	R	150	X	78
..	B	M	..	C	C	S	4	D	36x5	40x6D	R	R	151	..	76
SB	B	S	..	C	C	IC	3	D	5	5D	L	C	168	..	75

## Commercial Cars

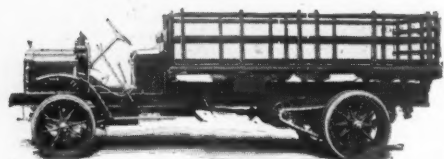
SL	B	S	SF	C	W	IC	3	F	36x6	36x6D	R	R	144	..	75
SB	B	S	SF	D	C	S	3	D	36x6	42x5D	L	C	148	..	60
SB	R	M	S	C	C	S	3	D	36x6	36x6D	R	R	165	..	70
R	SD	..	F	..	C	S	4	D	36x6	40x6D	R	R	128	..	..
..	B	M	SF	C	C	S	4	D	36x5	42x5D	R	R	154	..	73
R	E	S	F	C	C	S	3	D	36x6	40x6D	L	C	150	..	65
..	B	M	G	C	W	S	3	F	36x5	40x6D	R	R	168	..	..
..	B	M	G	C	W	S	3	F	36x5	40x6D	R	R	204	..	..
..	B	M	..	C	C	S	4	D	36x6	42x6D	R	R	151	..	77
R	MG	..	F	D	W	S	4	F	..	40x6D	L	C	156	..	80
SB	B	S	F	D	W	IC	3	..	..	D	R	R	138	..	60
SB	B	S	F	D	C	IC	3	..	..	D	R	R	150	..	60
SB	B	S	F	D	W	IC	3	..	..	D	R	R	150	..	60
SB	B	S	F	D	C	IC	3	..	..	D	R	R	138	..	60



Walter Four Wheel Drive, 5 ton Special Body, Chassis, \$4750.



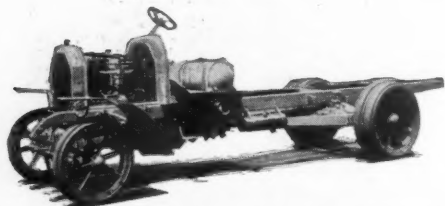
White Model ATCD, 5 ton Dump, \$5000.



White Model TCD, 5 ton Stake, Chassis, \$4500.



Durable Dayton Model L, 6 ton Dump, Chassis, \$4700.



G. V. Mercedes Model FV, 6 ton Chassis. Made by General Vehicle Co.



Rowe Model H, 10 ton Tractor, Chassis, \$4500.



Durable Dayton Model E, 7 1/2 ton Truck with Trailer, Truck Chassis only, \$4950.

## 5 Ton Gasoline

Model	Chassis Weight	Chassis Price	Styles of Stock Bodies Furnished	Height of Loading Platform	Maximum Speed	Horse Power	Cylinders	Bore	Stroke	Cylinders Cast	How Cooled
K	....	3600	United States Motor Truck Co., Cincinnati, Ohio.	44	11	32	4	4.5	5.5	2	C
TCD	....	4500	White Co., Cleveland, Ohio.	..	..	29	4	4.25	6.37	4	C
ATCD	....	....	Walter Motor Truck Co., New York City.	..	..	29	4	4.25	6.37	4	C
4-Wheel	10000	4750	..	32	14	31	4	4.37	6	4	C

## 5 1/2 Ton Gasoline

AC	8700	4000	International Motor Co., New York City.	39	11	40	4	5	6	2	C
AC	8700	4000	..	39	11	40	4	5	6	2	C
AC	8700	4000	..	39	11	40	4	5	6	2	C

## 6 Ton Gasoline

L	....	4700	Durable Dayton Truck Co., Dayton, Ohio.	..	10	44	4	5.25	7	2	C
F	....	4500	Garford Motor Truck Co., Lima, Ohio.	..	8	42	4	5.1	5.5	2	W
.....	8700	4300	Gramm-Bernstein Co., Lima, Ohio.	44	10	32	4	4.5	6.75	2	C
FV	7400	....	General Vehicle Co., Inc., Long Island City, N. Y.	46	10	29	4	4.25	5.9	2	C
.....	....	4800	Hurlburt Motor Truck Co., New York City.	..	12	34	6	3.75	5.5	..	C
K-60	8600	4500	Kelly-Springfield Motor Truck Co., Springfield, Ohio.	39	6	32	4	4.5	6.5	2	C
.....	12000	....	Morton Truck & Tractor Co., Harrisburg, Pa.	54	14	53	4	5.75	7	2	C
A-6	11000	4800	Royal Motor Truck Co. of N. Y., New York City.	34	10	42	4	5.1	5.5	2	W
A-6	11000	4800	..	34	10	42	4	5.1	5.5	2	W
S	....	4300	Tiffin Wagon Co., Tiffin, Ohio.	38	12	34	6	3.75	5.25	3	C
SW	....	4550	..	38	12	34	6	3.75	5.25	3	C
4-Wheel	11000	5000	Walter Motor Truck Co., New York City.	32	12	31	4	4.37	6	4	C

## 6 1/2 Ton Gasoline

.....	6900	5800	International Motor Co., New York City.	30	9	31	4	4.37	5.5	2	C
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## 7 Ton Gasoline

7	11500	5000	Royal Motor Truck Co. of N. Y., New York City.	34	10	42	4	5.1	5.5	2	W
7	11500	5000	..	34	10	42	4	5.1	5.5	2	W

## 7 1/2 Ton Gasoline

E	....	4950	Durable Dayton Truck Co., Dayton, Ohio.	..	10	44	4	5.25	7	2	C
AC	9500	4500	International Motor Co., New York City.	39	9	40	4	5	6	2	C

## Gasoline Tractors

AC	8000	4000	International Motor Co., New York City.	..	9	40	4	5	6	2	C
35	8400	4500	Knox Motors Co., Springfield, Mass.	..	..	40	4	5	5.5	2	C
36	10000	5000	..	..	..	40	4	5	5.5	2	C
H	....	4500	Rowe Motor Mfg. Co., Downingtown, Pa.	..	10	36	4	4.75	5.5	2	W
.....	12000	5250	Walter Motor Truck Co., New York City.	32	11	..	..	4.87	6	..	C

## 1 1/4 Ton Steam

Model	Chassis Weight	Chassis Price	Styles of Stock Bodies Furnished	Load Platform Height	Maximum Speed	Horse Power	Cylinders	Bore
820	3200	2100	Stanley Motor Carriage Co., Newton, Mass.	34	30	30	2	..

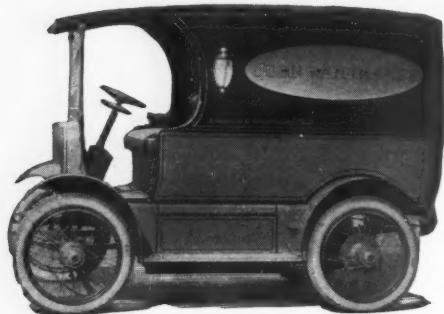
## 2 1/2 Ton Steam

SM20	5260	3000	Titan Motor Car Co., Newark, Del.	44	15	20	2	..
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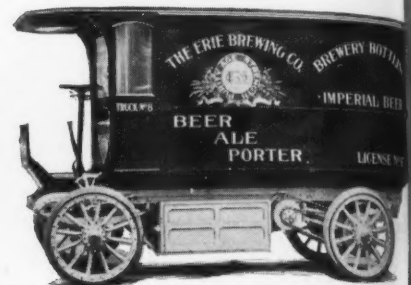


Ward Special 750 lb. Panel, \$875.

C. T. 1000 lb. Panel, Chassis without Battery, \$1640.  
Made by the Commercial Truck Co. of America.Baker Model X, 1000 lb. Screen Side, \$2175.  
Chassis with standard lead battery, \$1900; with Edison battery, \$2375.

Lambert Special Model A-1916, 1000 lb. Panel, \$1360.

Also Panel without battery, \$1125; Stake without battery, \$1085; Flareboard without battery, \$1025. Battery prices for this model—Edison, \$800; Exide, \$340; Philadelphia, \$325.  
Made by Joly & Lambert Electric Auto Co.

G. V. 2 ton Chassis with Battery, \$2600.  
Made by the General Vehicle Co., Inc.C. T. 1 ton Canopy Top, Chassis without Battery, \$2095.  
Made by the Commercial Truck Co. of America.Baker Model O, 1 ton Panel, \$2700.  
Chassis with standard lead battery, \$2300; Edison battery, \$2775.

## 750 Pound Electric

Model	Chassis Weight	Chassis Price	Styles of Stock Bodies Furnished	Height of Loading Platform	Maximum Speed	Mileage Per Charge	Motor Type	Controller Type
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WS ..... Ward Motor Vehicle Co., Mt. Vernon, N. Y. 27 12 40 S

## 1000 Pound Electric

X	1960	.....	Baker, R. & L. Co., Cleveland, Ohio.	38	15	45	S	
.....	1800	1640	Commercial Truck Co. of America, Philadelphia, Pa.	34	14	..	S	
.....	1800	1640	.....	34	14	..	S	
.....	2060	1950	General Vehicle Co., Inc., Long Island City, N. Y.	37	12	65	S	
.....	2325	1700	.....	36	12	50	S	
D	2300	925	Joly & Lambert Electric Auto Co., Andover, Mass.	P, S, FB	36	22	55	S
EO	.....	.....	Ward Motor Vehicle Co., Mt. Vernon, N. Y.	32	12	48	S	

## 1 Ton Electric

O	2940	.....	Baker, R. & L. Co., Cleveland, Ohio.	39	13	40	S	
.....	2300	2095	Commercial Truck Co. of America, Philadelphia, Pa.	37	12	..	S	
.....	2950	2100	General Vehicle Co., Inc., Long Island City, N. Y.	39	10	55	S	
A	3400	1590	Joly & Lambert Electric Auto Co., Andover, Mass.	P, S, FB	36	12	50	S
EA	.....	.....	Ward Motor Vehicle Co., Mt. Vernon, N. Y.	35	10	42	S	

## 2 Ton Electric

U	4025	.....	Baker, R. & L. Co., Cleveland, Ohio.	42	10	40	S	
.....	3200	2725	Commercial Truck Co. of America, Philadelphia, Pa.	36	10	..	S	
.....	4050	2600	General Vehicle Co., Inc., Long Island City, N. Y.	44	9	55	S	
B	4400	2100	Joly & Lambert Electric Auto Co., Andover, Mass.	P, S, FB	38	10	50	S
EB	.....	.....	Ward Motor Vehicle Co., Mt. Vernon, N. Y.	38	9	38	S	

## 3½ Ton Electric

CC	6220	.....	Baker, R. & L. Co., Cleveland, Ohio.	42	9	40	S	
.....	4800	3530	Commercial Truck Co. of America, Philadelphia, Pa.	42	9	..	S	
.....	5810	3250	General Vehicle Co., Inc., Long Island City, N. Y.	45	8	50	S	
EC	.....	.....	Ward Motor Vehicle Co., Mt. Vernon, N. Y.	42	7	33	S	

## 5 Ton Electric

EA	7040	.....	Baker, R. & L. Co., Cleveland, Ohio.	42	8	35	S	
.....	5600	3935	Commercial Truck Co. of America, Philadelphia, Pa.	43	7	..	S	
.....	6510	3700	General Vehicle Co., Inc., Long Island City, N. Y.	46	7	45	S	
ED	.....	.....	Ward Motor Vehicle Co., Mt. Vernon, N. Y.	46	6	28	S	

## 7 Ton Electric

.....	5900	4435	Commercial Truck Co. of America, Philadelphia, Pa.	43	6	..	S	
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BODY DETAILS OF CARS NOT ILLUSTRATED

G. V. 1000 lb. Worm Drive Chassis with Battery, \$1950.

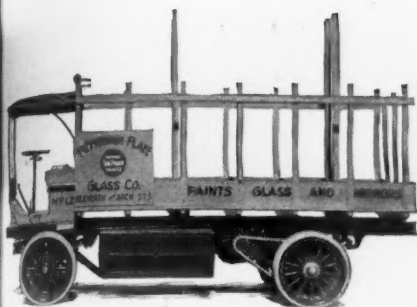
Made by General Vehicle Co., Inc.

BODY DETAILS OF CARS NOT ILLUSTRATED

G. V. 1000 lb. Chain Drive Chassis, with Battery, \$1700.

Made by General Vehicle Co., Inc.

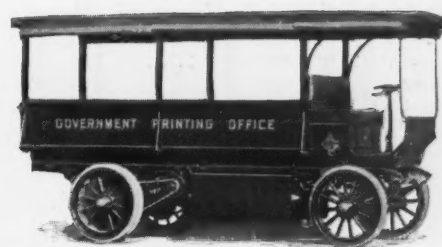
FIRST HALF OF REVIEW. LAST HALF WILL BE IN FEBRUARY ISSUE



Baker Model CC, 3 1/2 ton Special Stake, \$3855.  
Chassis without battery, \$3500; with Edison  
battery, \$4700.



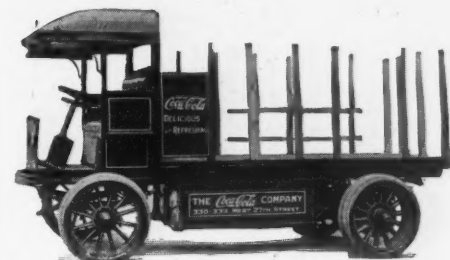
C. T. 3 1/2 ton Stake, Chassis without Battery,  
\$3530.  
Made by the Commercial Truck Co. of America.



Baker Model U, 2 ton Covered Flareboard,  
\$3150.  
Chassis with standard lead battery, \$2800; with  
Edison battery, \$3700.

### Commercial Cars

Speeds Forward	Drive	Rear Axle	Front Tires	Rear Tires	Steering and Control	Wheelbase	% Total Weight on Rear Wheels
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C. T. 2 ton Stake, Chassis without Battery,  
\$2725.  
Made by the Commercial Truck Co. of America.

B	3/4	Ward Motor Vehicle Co., Mt. Vernon, N. Y.	32x2 1/2	32x2 1/2	O	88	..
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### Commercial Cars

C	D	Baker, R. & L. Co., Cleveland, Ohio.	36x3	36x3	L	86	57
S	F	Commercial Truck Co. of America, Philadelphia, Pa.	36x2 1/2	36x3	L	90	60
S	F		36x2 1/2	36x3	L	100	60
W	F	General Vehicle Co., Inc., Long Island City, N. Y.	36x3	36x3	L	88	60
C	D		36x2 1/2	36x2 1/2	L	107 1/2	60
B	S	Joly & Lambert Electric Auto Co., Andover, Mass.	32	32	L	110	70
C	D	Ward Motor Vehicle Co., Mt. Vernon, N. Y.	32x2 1/2	34x3	L	90	..

### Commercial Cars

C	D	Baker, R. & L. Co., Cleveland, Ohio.	36x3 1/2	36x3 1/2	L	102	57
S	F	Commercial Truck Co. of America, Philadelphia, Pa.	36x3 1/2	36x4	L	100	60
C	D	General Vehicle Co., Inc., Long Island City, N. Y.	36x3 1/2	36x3 1/2	L	103	60
W	F	Joly & Lambert Electric Auto Co., Andover, Mass.	36x3 1/2	36x4	L	120	10
C	D	Ward Motor Vehicle Co., Mt. Vernon, N. Y.	34x3	36x4	L	99	..

### Commercial Cars

C	D	Baker, R. & L. Co., Cleveland, Ohio.	36x4	36x3D	L	120	60
S	F	Commercial Truck Co. of America, Philadelphia, Pa.	36x5	36x3 1/2D	L	116	60
C	D	General Vehicle Co., Inc., Long Island City, N. Y.	36x4	36x3D	L	112	60
W	F	Joly & Lambert Electric Auto Co., Andover, Mass.	36x4	36x5	L	130	70
C	D	Ward Motor Vehicle Co., Mt. Vernon, N. Y.	36x4	38x6	L	111	..

### Commercial Cars

C	D	Baker, R. & L. Co., Cleveland, Ohio.	36x6	38x4D	L	137	60
S	F	Commercial Truck Co. of America, Philadelphia, Pa.	36x3 1/2D	36x4D	L	115	50
C	D	General Vehicle Co., Inc., Long Island City, N. Y.	36x6	36x4D	L	128	60
C	D	Ward Motor Vehicle Co., Mt. Vernon, N. Y.	38x6	40x3 1/2D	L	132	..

### Commercial Cars

C	D	Baker, R. & L. Co., Cleveland, Ohio.	36x7	38x5D	L	137	60
S	F	Commercial Truck Co. of America, Philadelphia, Pa.	36x4D	36x5D	L	132	50
C	D	General Vehicle Co., Inc., Long Island City, N. Y.	36x7	36x5D	L	139	60
C	D	Ward Motor Vehicle Co., Mt. Vernon, N. Y.	40x3 1/2D	42x5D	L	159	..

### Commercial Cars

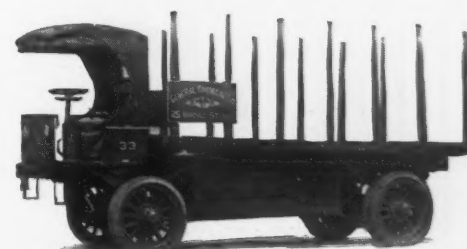
S	F	Commercial Truck Co. of America, Philadelphia, Pa.	36x5D	36x5D	L	132	50
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BODY DETAILS OF CARS NOT ILLUSTRATED  
G. V. 1 ton Chassis with Battery, \$2100.  
Made by General Vehicle Co., Inc.  
G. V. 3 1/2 ton Chassis with Battery, \$3250.  
Made by General Vehicle Co., Inc.

BODY DETAILS OF CARS NOT ILLUSTRATED  
G. V. 5 ton Chassis with Battery, \$3700.  
Made by the General Vehicle Co., Inc.



Baker Model EA, 5 ton Stake, \$4175.  
Chassis with Standard Lead Battery, \$3850;  
with Edison Battery, \$5300.



C. T. 5 ton Stake, Chassis without Battery,  
\$3935.  
Made by the Commercial Truck Co. of America.

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Royal Motor Truck Co. of N. Y.	32, 34	
Rush Delivery Car Co.	20	
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G. A. Schacht Motor Truck Co.	28, 30	
Selden Motor Vehicle Co.	24, 26, 28, 32	
Sphinx Motor Car Co.	20	
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Maker		Page
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## Gasoline and Electric Commercial Cars Indexed According to Chassis Price

\*Indicates Price Complete With Body

750 Pound Commercial Cars		
Price Cyl. H.P.	Maker	Page
875*	Electric. Ward Motor Vehicle Co.	36

800 Pound Commercial Cars		
Price Cyl. H.P.	Maker	Page
535	4 23 Metz Co.	20
690	4 23 Cortland Cart & Carriage Co.	20
725*	4 27 Willys-Overland Co.	20
750*	4 23 Cortland Cart & Carr. Co.	20
750	4 27 Willys-Overland Co.	20

1000 Pound Commercial Cars		
Price Cyl. H.P.	Maker	Page
485	4 26 Fostoria Light Car Co.	20
485	4 14 Bimel Buggy Co.	20
600	4 17 Sphinx Motor Car Co.	20
600	4 17 Kearns Motor Truck Co.	20
600	2 19 Duryea Laboratories	20
620	4 14 Vim Motor Truck Co.	20
620	4 16 Chadwick Engineering Wks.	20
625	4 17 Rush Delivery Car Co.	20
660	4 17 Martin Carriage Works	20
850	4 17 Chester County Motor Co.	20
925	Electric. Joly & Lambert Electric Auto Co.	36
1640	Electric. Commercial Truck Co. of America	36
1700	Electric. General Vehicle Co., Inc.	36
1950	Electric. General Vehicle Co., Inc.	36
2175*	Electric. Baker R. & L. Co.	36

1200 Pound Commercial Cars		
Price Cyl. H.P.	Maker	Page
1100	4 32 Henderson Bros.	20

1500 Pound Commercial Cars		
Price Cyl. H.P.	Maker	Page
940	4 20 Howard Motor Truck Co.	20
975	4 20 Auglaize Motor Car Co.	20
975	4 20 Bessemer Motor Truck Co.	20
1150	4 20 Palmer-Moore Co.	22
1290	4 20 Stewart Motor Corp.	22
1350	4 20 Garford Motor Truck Co.	20
1600	4 23 Krebs Commercial Car Co.	22
1600	4 27 Gabriel Auto Co.	22
1600	4 23 Tiffin Wagon Co.	22
2100	4 23 White Co.	22
2700	4 23 Lippard-Stewart Motor Car Co.	22
2900	4 23 Lippard-Stewart Motor Car Co.	22

1 Ton Commercial Cars		
Price Cyl. H.P.	Maker	Page
870	4 20 H. J. Koehler S. G. Co.	22
1200	4 20 Auglaize Motor Car Co.	22
1250	4 32 Auto-Truck Co.	22
1250	4 20 Trabold Truck Mfg. Co.	24
1290	4 20 Sanford Motor Truck Co.	24
1350	4 23 Palmer Moore Co.	22
1350	4 23 Palmer Moore Co.	22
1450	4 20 Garford Motor Truck Co.	22
1500	4 18 Commercial Truck Co.	22
1500	4 20 Gramm-Bernstein Co.	22
1500	4 27 Henderson Bros.	22
1590	Electric. Joly & Lambert Electric Auto Co.	36
1650	4 20 Chase Motor Truck Co.	22
1700	4 20 Selden Motor Vehicle Co.	24
1700	4 26 Warren Motor Truck Co.	24
1750	4 20 Hurlburt Motor Truck Co.	22
1800	4 27 Gabriel Auto Co.	22
1850	4 23 Adams Truck, Foundry & Mche. Co.	22
1900	4 26 Warren Motor Truck Co.	24

Price Cyl. H.P.	Maker	Page
2000	4 26 C. L. Barker	22
2000	4 27 Corbitt Automobile Co.	22
2000	4 26 International Motor Co.	22
2000	4 23 Krebs Commercial Car Co.	22
2000	4 23 Tiffin Wagon Co.	24
2095	Electric. Commercial Truck Co. of America	36
2100	Electric. General Vehicle Co., Inc.	36
2100	4 27 Maccar Truck Co.	22
2450	Rowe Motor Mfg. Co.	24

1 1/4 Ton Commercial Cars		
Price Cyl. H.P.	Maker	Page
1390	4 20 Stewart Motor Corp.	24
1600	4 23 Brockway Motor Truck Co.	24
1625	4 23 Brockway Motor Truck Co.	24
1825	4 23 Brockway Motor Truck Co.	24
1850	4 23 Brockway Motor Truck Co.	24
2100	2 30 Stanley Motor Carriage Co.	34

1 1/2 Ton Commercial Cars.		
Price Cyl. H.P.	Maker	Page
1650	2 18 Autocar Co.	24
1700*	4 23 Sullivan Motor Car Co.	26
1750	4 23 Lange Motor Truck Co.	26
1750*	4 23 Sullivan Motor Car Co.	26
1775*	4 23 Sullivan Motor Car Co.	26
1800	4 27 Bessemer Motor Truck Co.	24
1800	4 20 Gramm-Bernstein Co.	24
1800	4 23 Tegetmeier & Riepe Co.	26
1800	4 26 Warren Motor Truck Co.	26
1950	4 23 Chester County Motor Co.	24
2000	4 27 Gabriel Auto Co.	24
2000	4 23 Hurlburt Motor Truck Co.	26
2000	4 23 Kelly-Springfield Motor Truck Co.	26
2000	4 23 Selden Motor Vehicle Co.	26
2100	4 26 Warren Motor Truck Co.	26
2250	4 27 New England Truck Co.	26
2300	4 27 Adams Truck, Foundry & Mche. Co.	24
2350	4 26 International Motor Co.	26
2375	4 27 Crawford Automobile Co.	24
3000	4 23 White Co.	26

2 Ton Commercial Cars		
Price Cyl. H.P.	Maker	Page
1575	4 23 Auglaize Motor Car Co.	26
1800	4 23 E. G. Willingham's Sons	28
1900	4 27 Brockway Motor Truck Co.	26
1910	Sanford Motor Truck Co.	28
1925	4 27 Brockway Motor Truck Co.	26
2000	4 27 Bessemer Motor Truck Co.	26
2000	4 23 H. G. Burford Co.	26
2000	4 23 Selden Motor Vehicle Co.	28
2000	4 26 Warren Motor Truck Co.	28
2100	Electric. Joly & Lambert Electric Auto Co.	36
2125	4 27 Brockway Motor Truck Co.	26
2150	4 27 Brockway Motor Truck Co.	26
2200	4 30 Abbott & Downing Co.	26
2200	4 23 Corbitt Automobile Co.	26
2200	4 27 Chase Motor Truck Co.	26
2200	4 27 Knickerbocker Motor Truck Co.	28
2200	4 27 United States Motor Truck Co.	28
2250	4 27 Selden Motor Vehicle Co.	28
2250	4 29 Warren Motor Truck Co.	28
2250	4 29 Trabold Truck Mfg. Co.	28
2300	4 29 Garford Motor Truck Co.	26
2350	4 27 New England Truck Co.	28

Price Cyl. H.P.	Maker	Page
2350*	4 28 Sullivan Motor Car Co.	28
2375	4 27 Atterbury Motor Car Co.	26
2400	4 26 C. L. Barker	26
2400*	4 28 Sullivan Motor Car Co.	28
2450*	4 28 Sullivan Motor Car Co.	28
2450	4 27 Krebs Commercial Car Co.	28
2500	4 27 O. Armleder Co.	26
2550	4 27 United States Motor Truck Co.	28
2600	Electric. General Vehicle Co., Inc.	36
2600	4 32 Maccar Truck Co.	28
2600	4 27 Tiffin Wagon Co.	28
2650	4 29 Durable Dayton Truck Co.	26
2700	4 26 International Motor Co.	28
2725	Electric. Commercial Truck Co. of America	36
2750	4 30 Driggs-Seabury Ordnance Corp.	26
2800	4 27 O. Armleder Co.	26
2800	Rowe Motor Mfg. Co.	28
2800	4 29 G. A. Schacht Motor Truck Co.	28
2850	4 23 Blair Motor Truck Co.	26
3000	4 27 Hurlburt Motor Truck Co.	26
3000	4 32 Peerless Motor Car Co.	28
3000	4 26 Pierce-Arrow Motor Car Co.	28

2 1/2 Ton Commercial Cars		
Price Cyl. H.P.	Maker	Page
2250	4 27 Witt-Will Co., Inc.	28

2 1/2 Ton Commercial Cars		
Price Cyl. H.P.	Maker	Page
1800	4 23 Garford Motor Truck Co.	28
2250	4 27 Chester County Motor Co.	28
2350	4 27 Lange Motor Truck Co.	30
2500	4 27 Adams Truck, Fdy. & Mch. Co.	28
2600	4 29 Gramm-Bernstein Co.	28
2750	4 23 Kelly-Springfield Motor Truck Co.	30
2750	4 27 United States Motor Truck Co.	30
2800	4 27 O. Armleder Co.	28
3000	2 20 Titan Motor Car Co.	34

3 Ton Commercial Cars		
Price Cyl. H.P.	Maker	Page
3100	4 32 Crawford Automobile Co.	30
3100	4 27 Krebs Commercial Car Co.	30
3200	4 48 G. A. Schacht Motor Truck Co.	30
3200	4 32 United States Motor Truck Co.	30
3250	4 29 Blair Motor Truck Co.	30
3250	4 30 Driggs-Seabury Ordnance Corp.	30
3400	Rowe Motor Mfg. Co.	30
3500	4 29 Locomobile Co. of America	30
3700	4 32 Peerless Motor Car Co.	30
3700	4 23 White Co.	30
1775	4 23 Atterbury Motor Car Co.	22

3 1/2 Ton Commercial Cars		
Price Cyl. H.P.	Maker	Page
2600	4 32 A. R. King Mfg. Co.	32
2800	4 32 Bessemer Motor Truck Co.	30
2800	4 32 United States Motor Truck Co.	32
2850	4 34 Knickerbocker Motor Truck Mfg. Co.	32
2950	4 32 Selden Motor Vehicle Co.	32
3175	4 32 Atterbury Motor Car Co.	30
3250	Electric. General Vehicle Co., Inc.	36
3250	4 32 Maccar Truck Co.	32

## Gasoline and Electric Commercial Cars Indexed According to Chassis Price (Continued From Page 38)

\*Indicates Price Complete With Body

Price	Cyl.	H.P.	Maker	Page
3300	4	32	Chase Motor Truck Co.	30
3400	4	36	Durable Dayton Truck Co.	30
3400	4	29	Gramm-Bernstein Co.	30
3400	4	40	International Motor Co.	30
3400	4	32	Kelly-Springfield Motor Truck Co.	32
3500	4	32	O. Armleder Co.	30
3500*	Electric.		Baker R. & L. Co.	36
3500	4	29	Hurlburt Motor Truck Co.	30
3500	4	29	Royal Motor Truck Co. of N. Y.	32
3530	Electric.		Commercial Truck Co. of America	36
3855*	Electric.		Baker R. & L. Co.	36
4700*	Electric.		Baker R. & L. Co.	36
<b>4 Ton Commercial Cars</b>				
Price	Cyl.	H.P.	Maker	Page
3500	4	32	United States Motor Truck Co.	32
3600	4	32	Kelly-Springfield Motor Truck Co.	32
3650	4	29	Locomobile Co. of America	32
3750	4	32	Blair Motor Truck Co.	32
4000	4	32	Peerless Motor Car Co.	32
<b>5 Ton Commercial Cars</b>				
Price	Cyl.	H.P.	Maker	Page
3600	4	32	United States Motor Truck Co.	34

Price	Cyl.	H.P.	Maker	Page
3700	Electric.		General Vehicle Co., Inc.	36
3850*	Electric.		Baker R. & L. Co.	36
3935	Electric.		Commercial Truck Co. of America	36
4000	4	40	International Motor Co.	34
4175*	Electric.		Baker R. & L. Co.	36
4250	4	32	Kelly-Springfield Motor Truck Co.	32
4300	4	36	Garford Motor Truck Co.	32
4300	4	32	Gramm-Bernstein Co.	34
4300	6	34	Tiffin Wagon Co.	34
4500	4	32	Blair Motor Truck Co.	32
4500	4	30	Driggs-Seabury Ordnance Corp.	32
4500	4	36	Durable Dayton Truck Co.	32
4500	4	42	Garford Motor Truck Co.	34
4500	4	32	Kelly-Springfield Motor Truck Co.	34
4500	4	32	Peerless Motor Car Co.	32
4500	4	38	Pierce-Arrow Motor Car Co.	32
4500	4	36	Rowe Motor Mfg. Co.	32
4500	4	36	Royal Motor Truck Co. of N. Y.	32
4500	4	29	White Co.	34
4550	6	34	Tiffin Wagon Co.	34
4700	4	44	Durable Dayton Truck Co.	34
4750	4	31	Walter Motor Truck Co.	34
4800	6	34	Hurlburt Motor Truck Co.	34
4800	4	31	International Motor Co.	32

Price	Cyl.	H.P.	Maker	Page
4800	4	42	Royal Motor Truck Co. of N. Y.	34
5000	4	31	Walter Motor Truck Co.	34
5300*	Electric.		Baker R. & L. Co.	36

**6 1/2 Ton Commercial Cars**

Price	Cyl.	H.P.	Maker	Page
5800	4	31	International Motor Co.	34

**7 Ton Commercial Cars**

Price	Cyl.	H.P.	Maker	Page
4435	Electric.		Commercial Truck Co. of America	36
5000	4	42	Royal Motor Truck Co. of N. Y.	34

**7 1/2 Ton Commercial Cars**

Price	Cyl.	H.P.	Maker	Page
4500	4	40	International Motor Co.	31
4950	4	44	Durable Dayton Truck Co.	34

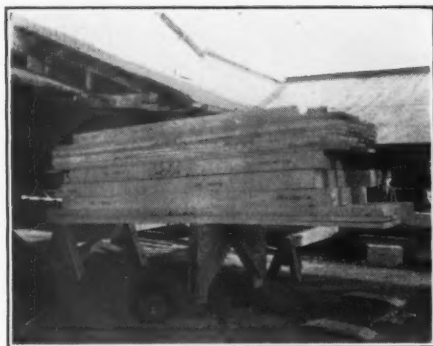
**Gasoline Tractors**

Price	Cyl.	H.P.	Maker	Page
4000	4	40	International Motor Co.	34
4500	4	40	Knox Motors Co.	34
4500	4	36	Rowe Motor Mfg. Co.	34
5000	4	40	Knox Motors Co.	34
5250			Walter Motor Truck Co.	34

FIRST HALF OF REVIEW. LAST HALF WILL BE IN FEBRUARY ISSUE

## GOODYEAR EXPLAINS COLORS IN RUBBER

P. W. Litchfield, factory manager of the Goodyear Tire & Rubber Co., throws some interesting light on the different colors of rubber tires in a statement recently issued. In this educational article he states that the public generally knows nothing about rubber, often wondering whether gray, black, white or red rubber is best. Pure rubber, as tapped from the tree, is a creamy white, and it is sometimes coagulated to retain its creamy color, but more often it is smoked to give it a transparent brownish color. All rubber, when used commercially, must be vulcanized with sulphur. If the rubber is pure and contains nothing but sulphur, it will be gray after it is vulcanized, but when stretched into thin sheets and held to the light it will be almost transparent, and of a pale brown or creamy color. When rubber is any other color than this it has been treated with chemicals for imparting to it special properties, usually to toughen it and to give it additional wearing qualities. A pure white rubber is usually produced by the addition of oxide of zinc, which is one of the best tougheners of rubber. Black is usually produced by the addition of lamp-black or some organic chemical, while red is produced by the addition of antimony of iron. Some time ago most tires were gray, usually on account of the combination of lead or zinc oxide. American-made oxides, which have increased in price, are not sufficient to take care of the trade, while the imported material has increased over 400 per cent. There is practically none obtainable, even at this high price. The discovery of new materials to replace lead made possible the production of pure white stock. The mere color of rubber indicates absolutely nothing as to its quality; both tough and poor wearing stock can be made in any color—white, black, red or gray. Many times coloring matter is put into the rubber simply to please purchasers who prefer a certain colored tube or tire.

**Truck Knocks Out Trestle to Take Load**

The Jones Lumber Company, of Portland, Oregon, by using special trestles, one of which has only two legs, is enabled to back the truck under the trestles, knocking down the one with two legs, and leaving half the weight of the lumber on the rollers of the truck, from which point it is easily rolled into position on the truck body by hand crank.

The Dixie Highway Commission has spent \$5,000,000 on the construction of the road during the last half year, and over \$20,000,000 worth of construction is already planned.

## BABCOCK BODIES FOR FORD COMMERCIAL CARS

A recent development in the light delivery car field of interest to business men and merchants, is that the H. H. Babcock Co., Watertown, New York, is applying to bodies the quantity idea that has proven so successful in the automobile business. The accompanying illustration shows a Babcock body, which is built in thousand lots on the unit plan: eight different types, to fit every requirement in light delivery service, built up from one standard body-base by adding units.

Babcock bodies are delivered painted, complete with all fittings and ready to assemble, which can be accomplished in an hour with a wrench.

It is estimated that the number of motor trucks built by the members of the National Automobile Chamber of Commerce during 1915 will be 34,000. The members of the N. A. C. C. build about three-quarters of the total number of commercial cars made in the United States. The total production for the year will be about 45,000. Half of this number went out of the country.



Babcock Body Built Specially for Ford Chassis

The CCJ leads in circulation, advertising and prestige

### TEST OF AN INTERNAL-GEAR DRIVE AXLE

The manufacture and sale of motor trucks on a big scale is of such recent occurrence in this country that engineers have had little opportunity to observe the effects of hard service on standard parts.

One of the manufacturers of internal gear drive axles recently had an opportunity to measure one of the axles of his make that had been in use for two years under close observation, and decided to make the findings public for the benefit of those who might be interested in the life of the component parts of a motor truck of modern construction.

This axle was sold two years ago to a manufacturer of motor trucks who was then and now is using another type of drive. This manufacturer wished to try out the internal gear drive type for his own satisfaction. The axle was placed under a truck of 1½ tons rated capacity. For three months it was run night and day under a full load. Part of the work consisted of going over the tracks in railroad yards and up steep embankments at an angle. Soft, sandy roads and rough, hard roads were tried at various time during the three months' test and at the end of that time the experimental truck with this axle was placed in delivery service with instructions to give it hard usage. Since the axle was first delivered the manufacturer of the truck in which it has been mounted estimates that it has averaged in excess of 50 miles a day for 300 working days in each year, or a total of 30,000 miles for the two years.

With the exception of the outer hub bearings the wear on either the inner or outer races of the bearings did not exceed .001 in. Practically the only bearing wear effect was found in the outer hub bearings. The shoulder supporting this bearing had not been made wide enough in the first place and this had allowed the outside race to stretch and the inner race to become loose. This had been foreseen, however, soon after the axle had been placed in service and the shoulders on the other axles of the same type had been widened. This change was not made on this axle, though, as it had been decided to allow the narrow shoulder to remain to see just what the result would be. One inner bearing had been replaced some time before as a spacer had been left out at one time when the wheel was removed and this had allowed the bearing to run endwise. A thorough examination of the bearings was made and it was thought that from their condition that their minimum life would be something in excess of 100,000 miles. This estimate is regarded as of the highest significance in view of the fact that some engineers have feared that in any type of axle the bearings on a truck would be among the first parts to show wear.

The differential and bevel gear set were found to be in perfect mesh and no wear had taken place in any of the gears. The teeth, indeed, had just reached a good polish. From this it was judged that these gears would outlast all other working parts of the truck.

The driving pinion at the wheel had been made of 3½ per cent. nickel steel with hard-

ened teeth and no wear on it was noticeable. The internal or ring gear, bolted to the wheel, was of carbon steel and had been left soft. This gear meshes with the hardened pinion and showed wear of approximately 1/64th in. on the pitch line. The mesh was still perfect and both gears were put back in service as they were quiet and there would be no perceptible loss of efficiency with the small amount of wear noted. It is a fact that the maker of this axle now hardens the teeth of both the ring and pinion gears. From this the maker estimates that the pinion gear on this axle is practically indestructible while the ring gear is good for another two years of hard service at the very least.

The greatest wear outside of the ring gear was noted in the squared end of the propeller shaft where a slight looseness of the fit of the universal joint had caused wear of about .002 in. All housings were as tight as when the axle was originally assembled.

The wear on the axle after two years' service could be summarized as follows:

Bevel gears .....	None
Differential gears .....	None
Driving pinion .....	None
Internal gear .....	1/64
Bearings .....	.001
Propeller shaft, axle end .....	.002

From this examination it would appear that the life of the internal gear axle may be looked on as at least equal to that of any other part of the truck. The gears, it was found, do not need replacement even when worn to some extent, as they retain their quietness after having been worn. From this it is judged that the only axle parts needing occasional attention are the brakes and lubrication of the bevel gears at infrequent intervals.

### MASTER PLUGS TO HAVE NEW COMPOSITION INSULATOR KNOWN AS CALORITE

The Hartford Machine Screw Co., of Hartford, Conn., maker of the well-known Master Spark Plug, is making insulators of a special composition, which has been thoroughly tested by this concern, and Master Spark Plugs will hereafter be equipped with this new insulator. Both material and finished product are made in this country and consequently not affected by the war.

This new material is somewhat similar in appearance to porcelain, although it is greyish in color and has not quite such a glossy appearance and under the most severe strains, both due to extremes of heat and cold and also electrical strains, it has shown itself superior to porcelain as formerly used by this company. One test to which it was subjected was to heat some of these new insulators white hot and then plunge them into cold running water which was repeated 10 times without any sign of fracture. They were then run in a break down test and heated to a bright cherry red 26 times without sign of fracture; the 27th time a small crack appeared and the 28th time a part of the insulator cracked off.

This composition has stood up under electrical tests better than the porcelains used by this concern.

### THE MEYER'S LIGHTNING CHAIN CONNECTOR

The Stewart Accessories Mfg. Co., of Detroit, Mich., calls attention to its Meyer's Lightning Chain Connector, which is designed primarily for repairing heavy truck chains.



Meyer's Chain Tool for Truck Chains

The tool is used by placing hooks in chain, then working handle back and forth, so that the ends of the chain are drawn together. The tools hold them in position ready for the insertion of the repair link. After chain is repaired the pin (attached by chain) is pulled out and the tool is instantly released. Price of tool is \$3 for chains ⅝ in. to 9/16 in. roll size, and \$3.50 for chains ¾ in. to 1 ⅛ in.



Easylon Truck Tire Chains

This illustration shows the Easylon tire chains designed for use on solid truck tires. These are made by the Leather Tire Goods Company, of Niagara Falls, N. Y., and were described in these columns in the December 15, 1915, issue.

### MARTIN ROCKING WHEEL TAKES OVER RIGHTS OF C. H. MARTIN

Martin Rocking Fifth Wheel Co. has taken over the business and the patent rights of C. H. Martin, Springfield, Mass. The officers of the new corporation are C. H. Martin, president, Adolf A. Geisel, treasurer and general manager; H. G. Farr, secretary.

The tractor-semi-trailer business had grown to the point where it was necessary to take in additional capital in order to supply the fifth wheel connections as fast as they were ordered. In addition to making fifth wheels in different sizes—from one that makes a Ford roadster into a 1-ton tractor to one that makes a 5-ton truck into a 10-ton tractor—the new company plans to make semi-trailers for the Ford size.

Standard Tractor Co., formerly located at 68 Flushing Avenue, Brooklyn, N. Y., has moved into larger quarters at 120-28 Waverly Avenue.

# Concrete Warehouses, Conveyors and Motor Trucks

Inseparable Companions Denoting Modern Business Efficiency—Inevitable Successors of Telephone, Typewriter, Filing Cabinet and Adding Machine

By FRANK REED

**L**OOKING for mechanical conveying equipment utilized in connection with motor trucks, one discovers a simple rule for saving time. Do not go to the conveyor man—he will tell you all about the defects of his competitors' systems, but not where their installations are located. Keep away from the motor truck salesman—the subject is too deep for him, only the "big fellows" in the truck business are yet awake to its significance. Telephone to the nearest office of a big Portland cement manufacturing company, and get a list of the reinforced concrete warehouses; then you are started right. Conveyors and motor trucks seem to be inevitably associated with concrete warehouses. No doubt it is because all three are distinctively modern devices that aid expanding businesses.

The installation of a conveyor system requires good engineering ability, with specialized skill in conveyor problems, the knowledge of a man who has handled for a long time the clerical and manual labor of warehouses, a knowledge of the actual capabilities and efficiency requirements of motor trucks and an insight into the trend of business development. As no business has any man working in a humble capacity who can satisfy all these requirements, there are a shocking number of installations that have been bought of the lowest priced man, who hurried the stuff into some position or other, to later demonstrate that first cost is the poorest of all bases for buying anything that can influence future operating charges.

It is in cases where the matter has had the deliberate analytical attention of experienced and forward-looking executives that real success has been achieved. These good examples not only point to the folly of citing failures and partial failures as arguments against the use of mechanical aids to rapid loading and unloading, but plainly establish certain fundamental principles for the permanent guidance of future practice. They also emphasize, by their diversity, the point that every separate installation is a problem requiring most minute and painstaking investigation before an installation is made. Even such matters as the layout of salesmen's routes, the method of transportation they employ, and the method of handling their orders, may have a vital bearing on the efficiency of the conveyor system and, in turn, the efficiency of the entire delivery system.

Los Angeles is just about an average city with respect to the recognition of the conveyor truck problem. It is really waking up to the fact that, with motor trucks on the job, the ordinary freight elevator, if properly designed into the system, be-

comes a truck efficiency promoter and a money maker. As for other conveyors, it is experimenting.

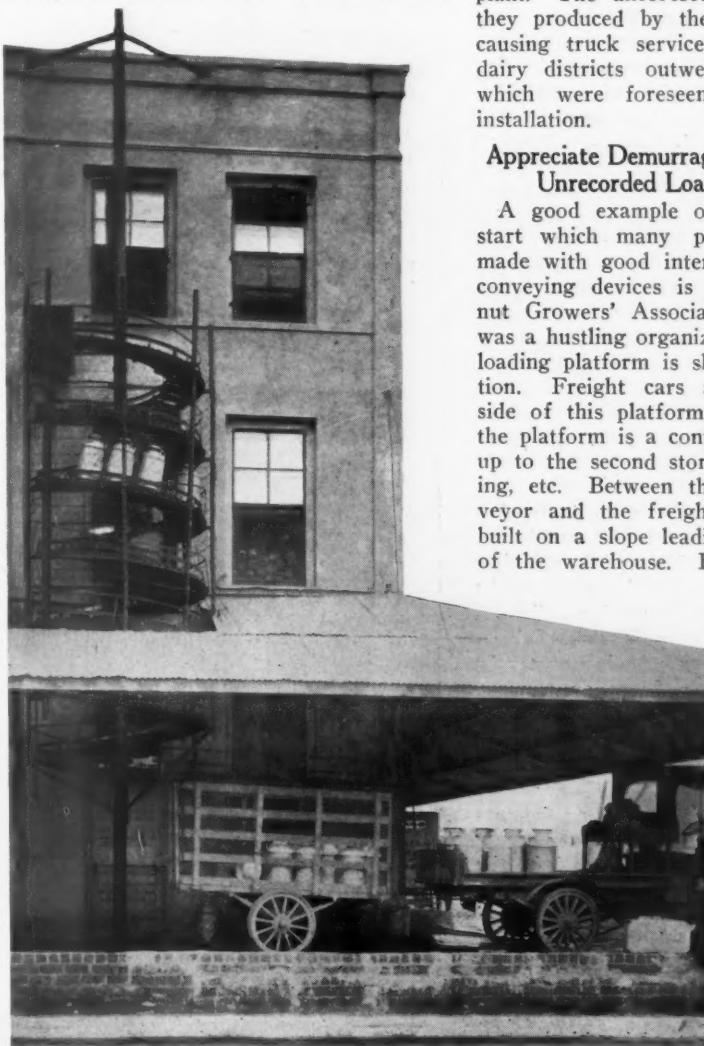
## Principal Advantages of Conveyor Installed in Horse Days Produced Through Subsequent Motorization of Haulage

There is one plant in Los Angeles that would make the casual visitor remark that motor trucks flock around up-to-date conveyor equipment like humming birds over a tiger lily bed. It is that of the Los Angeles Creamery Co., at Tenth street and Towne avenue. This is the plant that takes the milk that has been the foundation of Amos R. Brooks' \$600 a month profit hauling business described in a previous article. By conducting its loading platform service in a vertical instead of a horizontal direction it contributes to both interior efficiency and exterior, that is motor truck efficiency. The truck drives up to the platform and the driver hands over a can of milk, which is carried up by a step of a chain conveyor speeded to take

a can every six seconds. This means getting rid of a 50-can load in five minutes. By the time the wagon has rolled forward to the position under the down-coming chute the first lot of empty cans from the load it brought is waiting at the foot of this spiral conveyor. The existence of these quick handling devices, which permit a truck to unload, take on its empties and get away early in the forenoon with the rest of the day free for other commercial hauling, has undoubtedly contributed to the practically complete substitution of truck haulage for horse haulage to this plant which has occurred. The creamery company finds that this not only saves the cost of hauling the milk from the local delivery point on the steam or electric railroads, but gets the milk in earlier in the day and with a shorter time spent in transit, which is a great advantage to a distributing organization for handling this particular product. The conveyors were installed in horse days solely with a view to concentrating the interior layout of the plant. The unforeseen advantages which they produced by their indirect influence causing truck service to the plant from dairy districts outweigh the advantages which were foreseen and caused their installation.

## Appreciate Demurrage Charge, But Not Unrecorded Loading Cost Drag

A good example of a kind of a half start which many people have already made with good intentions in the use of conveying devices is the California Walnut Growers' Association. If ever there was a hustling organization it is this. The loading platform is shown in the illustration. Freight cars are run up to one side of this platform. About midway of the platform is a conveyor carrying goods up to the second story for sorting, cracking, etc. Between the foot of this conveyor and the freight car is a platform built on a slope leading to the first floor of the warehouse. From this first floor



**Spiral Unloading and Loading Device Used by Creamery.**

Compact upward chain and platform conveyor for unloading full milk cans and spiral chute for returning empties, used by Los Angeles Creamery Company. Note man up the spiral to turn can that has fallen over and blocked the movement

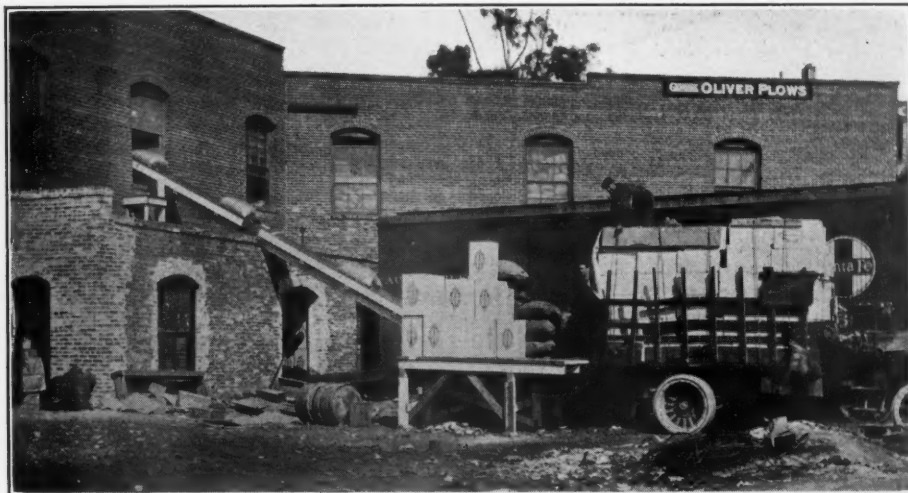
are brought out fiber boxes containing cartons of high-grade walnuts. These fiber boxes of cartons are sometimes sent out by rail and many hundreds of them are sent out by motor truck. In the present rushed season motor trucks are being loaded with these cartons simultaneously

by doing a routing operation, and the truck is subjected to a delay greater than the horse vehicle, in proportion to its greater carrying capacity. The cause of the delay lies in the general system of doing business, apparently at least in part, as orders are not received at the loading plat-

tunity to link up the facilities by a slightly revised operating system that would take advantage of the full working ability of trucks and conveying appliances already installed. Incidentally it would reveal where additions to the conveyor equipment, and further replacement of horses by trucks, which might not be considered necessary under the present scheme, would offer distinct advantage under a more closely knit plan of operation.

#### Santa Fe Warehouse Finds Truck Owners Appreciate Quick Loading Service

The Santa Fe Warehouse is a modern concrete structure built in 1912, of seven floors, with a total floor area of about 200,000 sq. ft. It is served at the rear and south end by railway tracks. The front and north end have nine loading doors in a total length of 250 ft. of wall space, and in addition the front has a chute through which bags of flour are ejected from tubes leading down from upper floors, directly onto waiting trucks. Mr. C. W. Small, vice-president of the Santa Fe Warehouse Co., says that quick handling arrangements, including various interior mechanical devices, they consider an essential part of the equipment of their warehouse for the class of service that meets the demand and requirements of their customers. "We operate motor trucks of our own," says Mr. Small, "and we know just how we feel and the expense it is to us when they are held up waiting to unload at the 'other fellow's' platform. So in our construction and equipment we have provided a warehouse that will let trucks come in, load and get away in the minimum of time. A feature in producing this desirable result is the wide, cement-paved, open space before our doors. Trucks are compelled to wait outside, and there is no narrow passage in which an incoming or standing truck can block one that is loaded and trying to get out, or



Loading Platform of California Walnut Growers' Association

with the unloading of sacks from the cars. In this case the conveyor is just far enough from the car door so that sacks have to be trucked or dragged across to it, while the cartons are being trucked out across this path to the section of the loading platform devoted to the motor loading truck. The men time themselves to alternate in these criss-crossings so that they do not interfere. It is a toss-up between the question of car demurrage and efficiency of the heavy gang of labor employed in the warehouse as the incentive for installing the upward conveyor. This preliminary recognition of the conveyor system is making good in fine shape. A simple change in layout at the expense of a few dollars would give them a gravity carrier for loading case goods into cars or motor trucks and saves the constant trucking back and forth.

#### Has the Equipment, But Lacks System to Get Full Benefit

Western Wholesale Drug Co. is another large firm operating a concrete warehouse, which is equipped with conveying devices for vertical service, using three types—the well-known gravity carrier using rollers, a spiral chute and ordinary elevator. Ninety per cent. of the matter outgoing on trucks is handled from other floors on a regular freight elevator. Special double-decked trucks, shown in the illustration, are loaded on the upper floors and brought down in the elevator. Only specials, singles, etc., are handled to the loading floor on the special carriers, which, however, are largely used for floor to floor work and in the general internal operation of the warehouse. Routing and checking is performed at the back of the loading platform. Orders are routed in advance, but drivers have to pick out the packages, and arrange the load according to route. In other words, the driver has to delay his loading

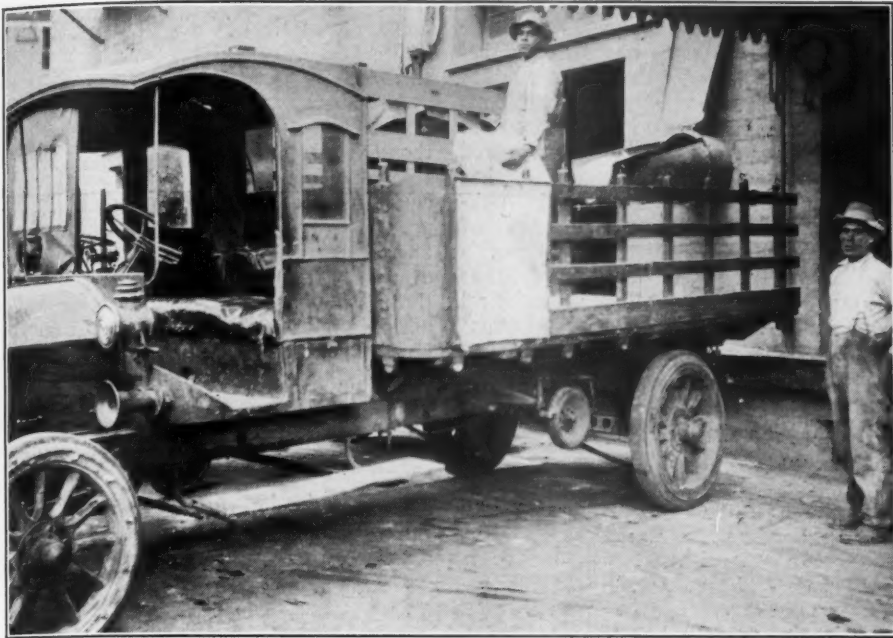
form in time to permit complete pre-routing. The situation at this place is interesting as an example of a very active and ably managed house, aggressive in its sales policy and thorough going in its service, that has made a heavy investment in modern facilities, in the shape of concrete warehouse, ample loading platform and approach space, and partial conveyor equipment. But it is not yet fully motorized, and is just now subjecting the whole heavy investment already made to the drag of operating methods that are tied down to the pace of the surviving horse equipment. Executive attention to the problem in its broad phases would reveal an oppor-



Loading Platform Western Wholesale Drug Company

Being remote from elevator and conveyor actually installed, they are not so utilized as to promote truck efficiency. Note partial routing in double-deck platform trucks

The CCJ has most advertisers because it gives them biggest returns



**Chute of Special Tube for Rapid Loading of Motor Trucks With Sacks of Flour, Santa Fe Warehouse**

in which a loaded truck can delay one ready to move into its place for a new load. If there is any waiting to be done, which on account of the multiplicity of our doors is at a minimum, it is done outside, and this causes the least delay."

"In the use of the chute for loading flour, sacks are dumped into the chute upstairs by our men, who are trained to handle them just as fast as they can be taken away and properly stowed on the load. In other words, we put it up to the employee of the man who sends the truck here to be loaded to take care of the stuff at the pace that goes with truck operation, and so give the truck owner the real benefit of his facilities and of ours."

Crated goods are brought down from the upper floors of the warehouse in a spiral chute made by Haslett Spiral Chute Co., San Francisco.

Heavy goods are handled by monorail overhead system and Yale & Towne block, on the first floor, terminating in an out-of-doors extension, from which the heavy goods may be lowered directly into a waiting truck.

At the rear of the warehouse, rapid unloading from cars is taken care of by a Brown portable elevator, which is brought into use whenever as many as seven or eight cars of the same kind of material, suitable for handling on this type conveyor, are to be unloaded. The elevator for downcoming goods to load on trucks and the end of the spiral chute are so located that no hand trucking on the lower floor of the warehouse is necessary. One helper can pass goods direct from the floor of the elevator or base of the chute to the man in the truck, or if need existed, it would be no hardship for a man to load without a helper.

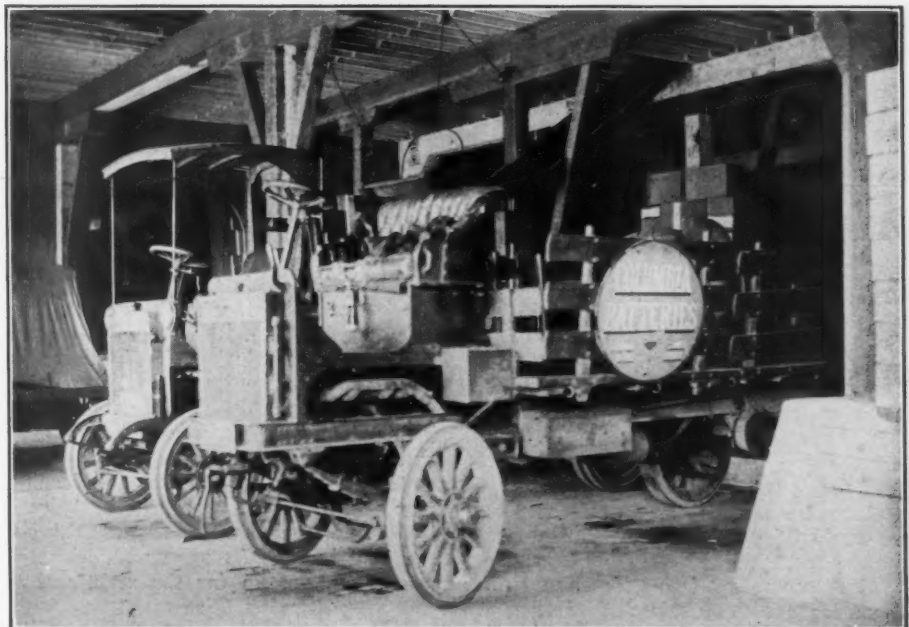
#### **Warehouseman for Eighteen Years Sees New Era**

"The present tendencies of doing business are unfavorable to warehousemen. Our remedy is in introducing motor trucks and conveying equipment," said Charles T.



**Operating Efficiency Secured by Sound Engineering**

Quick loading actually achieved by correct location of terminus of spiral chute, Santa Fe Warehouse



**Loading Bay in Davies Warehouse, Los Angeles**

This warehouse, facing two streets, has a loading bay cut in each side. They are experimenting with a home-made trough chute with hinged lower end which may be lowered directly into the wagon bed

B. Jones, secretary of the Davies Warehouse Co., at the beginning of a talk, in which he went to the foundation of the whole problem as related to the motor truck.

"Warehousemen, under the present methods of charging, make their profit out of income from storage. Their interest lies in having goods come to them and lie idle in the warehouse for a long time. If a large volume of goods are dealt in, but the stock is constantly being drawn upon and replenished, it is a bad account for them. Their cost that worries the warehousemen is labor cost—and an active account may mean so much labor as to cause an actual loss.

"Under this kind of system, which was all right in the old days when it was put in effect, the warehouseman is now bucking the full force of the current of up-to-date business activity.

"The development of communication, transportation, office appliances and business organization utilizing these facilities has, as everybody knows, brought about a revolution in the method of distributing products. In the out-of-town territory surrounding this distribution center we find that the grocer who used to lay in stock for a month now takes stock for three days. He is called upon more frequently by salesmen, who visit him in automobiles, and he can reach his grocery supply in a few hours by mail or a few minutes by wire and be assured of prompt delivery by rail or motor truck. That means that the warehouseman and, in fact, the jobber and manufacturer who carry their own stock and ship direct must seek to reduce the burden which the increase in movement is putting upon them in the way of labor charges." Mr. Jones is very emphatic and unequivocal in the statement by which he sums up the result of his analysis of the problem which he has given much thought for some time past, that "if a

warehouse had full and well-designed equipment for interior conveying and rapid loading of motor trucks it would make on its labor where it loses now." His own company uses trucks and finds that in the case of an active account it can handle with trucks twice the goods that it did with horses. Mr. Jones mentioned the well-known tendency of the introduction of trucks to expand trade and develop new business through better service and reaching wider territory. While formerly they had a drive right through their warehouse, which they would probably have continued if they had been obliged to put up with horse hauling, they have now closed up this and turned the space into profitable use and have provided a modern concrete paved delivery

way on each side of the warehouse. One of these is shown in the illustration, it being the smaller one. They have provided in each of these delivery bays an open trough chute from the second floor, with a hinged lower end, which may be lowered directly into the wagon bed. This has been found suitable for light-weight packages, cartons and sacks, such as sacks of flour. The freight elevator, of course, is used for the heavy goods and Mr. Jones is now considering the installation of a spiral chute for handling medium-weight cartons and boxes.

The final statement of Mr. Jones, summing up his experience, is that "the warehouse must recognize the modern tendency to keep goods moving. If it will do this and equip with modern devices it can make

more money than it did in the old days, in the old way, and let goods go out as fast as they like."

As this warehouse handles many well-known nationally used products, such as those of Armour & Co., Libby, McNeill & Libby and the National Carbon Co., the conditions that led Mr. Jones to his highly progressive and interesting conclusion are undoubtedly duplicated in many hundreds of warehouses and business establishments throughout the country. And it is worth noting that Mr. Jones and the company he represents are apparently of the conservative type, very sure of their ground before they commit themselves to a new line of thought or action, so his statement is a very strong brief for the conveyor in connection with the motor truck.

## Trucks the Logical Short-Haul Carriers

By FRANK REED



**C**OLYEAR MOTOR SALES CO., of Los Angeles, Cal., went into the business because they saw a demand. They believed, says Vice-President A. T. Neely, "that the truck would be a winning competitor of the railroad for short haul business as instead of multiple transfers with increased risk and divided responsibility, it gives a single loading and unloading and a single responsibility throughout the trip." They sold their first truck in 1907. Financial burdens which they did not anticipate have been felt at various times, due in the early days to refusal of factories to replace parts the dealer knew to be defective, and replaced at his own expense.

They are agents for the Velie, the Modern and the Gramm-Bernstein, and were agents for the Gramm until the line was discontinued. Their trucks have been sold principally for general transfer and hauling business and furniture moving by furniture houses, and moving contractors. Southern California road conditions enable a dealer to handle a large territory.

The first sale took a lot of time to demonstrate. People were afraid the truck wouldn't do the work. The dealer had to practically guarantee performance. During the past three years, however, he has sold trucks practically without starting the engine till they have been bought.

### Rise in Price Brought Order

E. J. Brent, the veteran furniture dealer of Los Angeles, was called on by Mr. Neely, who suggested to Mr. Brent that it was about time he bought another truck like the one he had put in service some time previous. Mr. Brent could not see it that way, and Mr. Neely remarked that he would have to charge him \$100 more for the truck anyway, thinking this was a good chance to get it off his chest before they ever got to a point of making an actual trade. When he reached the office the next morning he was surprised to find an order for the truck for immediate de-

livery. A little later, seeing the buyer, he asked: "Why did you change your mind?" Mr. Brent, speaking from the ripeness of his business experience, said: "When I am selling dressers as fast as I can buy them, do I cut the prices? Well, then, show me a man who is going up on his goods and I know he is selling them, and they are what I want."

### Demonstration Sold Furniture Dealer Not Only a Truck but Success

In the days when the prospective buyer figured on getting \$50 worth or so of free hauling in the course of a demonstration and the dealers had to give it or make no sales, Mr. Neely got a chance to substitute a truck for horses on a haul of furniture to Santa Monica for a good prospect. He tried to learn the fair time for a horse haul on a similar trip, but the prospect would not give it to him. They put on a big, heavy load, complete furniture for a six-room house, had it packed well, and Neely made a quick trip down, and by cigars and like inducements got the boys to hustle it off in lively fashion. Five hours from the time they started he was back at the dealer's, who greeted him gruffly: "Where did you break down?"

Neely said: "Oh, the machine is out on the road," in an assumed crestfallen manner.

"Just what I thought," yelled the furniture man. "Now, what in thunder am I goin' ter do?"

When he found that the furniture had been delivered he began to worry about scratches from quick handling, and called in his shipping clerk, who had gone along, and testified the unloading and placing had been done O. K. Then the furniture man confessed that previous deliveries had taken four horses, who would start the load in the afternoon and drive to a warehouse, put up for the night and the following morning drive to Santa Monica, unload and be back at 8 or 9 p. m., killing twenty hours or two whole days working time. This experience showed him that

with a truck he could afford to go after trade in the suburbs, and from that day originated a change of policy that made his business much larger, and a consistent user of motor trucks.

Service is the first essential, Mr. Neely has decided, as a result of his experience in selling trucks. A dealer must have parts to install at a moment's notice. He must be able to duplicate any part if it goes bad and, in fact, be able not only to supply the part but supply men to go out and put it on the truck so that the man will not have to throw off his load. The cost of making a replacement in this way is small, compared to what a man will have to pay to unload and hire or substitute another truck to move the load, and make a replacement at the shop.

Conditions and principles contributing to success he places as follows:

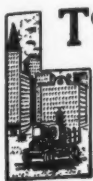
1. Being able to keep a car sold in service.
2. Ability of trucks to deliver the goods direct to user, supplying single and unavoidable responsibility.
3. Ability trucks confer on their owners to go into the market and buy own goods and haul perishables direct.
4. Dealer having ample materials and men, keeping open all the time and exercising supervision to give dependable day and night service.
5. Ability to carry own paper, sufficient capital to finance bills and service. Even large business houses want to split payments.

The future is estimated by him to be very good for small trucks 1000 lbs. to 2 tons. Their sale will come with the general growth of the country. People are learning that it is better to do their own hauling than to depend on railroad companies. Delivery is an essential part of the service of any business, and motor trucks enable the owner of the business to control this vital element affecting its growth and profits.

The CCJ brings greatest returns to advertisers because of largest circulation among quantity buyers

# The Tale of Tom the Tinkerer

By LEN G. SHAW



**T**OMLINSON entered the office just in time to discover that trouble was brewing. McMasters, at the telephone, was holding a spirited conversation with somebody, and his manner indicated that the talk was not of a peaceful nature.

"Well, we'll send a man over right away to get you started," he said, then hung up the receiver and turned from the 'phone with an impatient jerk.

"It's that infernal Mahlin truck again," he volunteered, reading the inquiry in Tomlinson's eyes. "Mahlin just telephoned and said we could fix the truck up so it would run at least half the time, or we could sue for the balance of the purchase price and go hang so far as he was concerned."

Tomlinson was blessed with a sense of humor that came to the surface whatever the difficulty.

"Well," he said, with a grin, "if we were to sue Mahlin for the rest of the price, he'd probably come back with the claim that the truck he has isn't the one we sold him, and I'll bet he'd get away with it, too."

"How could he do that. What do you mean—are you crazy?"



"I'm going to take a ride around with your driver this afternoon."

"Never more serious in my life," said Tomlinson, gravely. "Mahlin's had that truck a month, hasn't he?"

"Just about—yes."

"In that time, to my positive knowledge, we have practically rebuilt it twice, and at our own expense, too. About the only original parts left are the frame and the seat, and there couldn't very well anything go wrong with either of them; so you see it really isn't the car he bought."

"Maybe not," said McMasters, forcing a smile at the logic of his chief salesman, "but it is the car we sold him, or at least parts of it, if you want to quibble over that point. And it has been nothing but trouble, trouble ever since, until I'm sick of the whole deal; wish the driver would run into a pole and smash the machine to smithereens; it's insured in Mahlin's favor."

"And kill the driver, too," suggested Tomlinson.

"Not so bad as that. But your job is all picked out for you. I want you to go over to Mahlin's place and locate the trouble with that truck. None of the others we've sold ever caused such annoyance, and I

don't want you to quit Mahlin's until you can bring the answer. Go to the bottom of it, and if it is our fault we'll make it right. But I want to know—I've got to be shown."

Tomlinson could truthfully have confessed to being baffled by the conduct of this particular truck, but he was not built that way. Instead, he accepted the task with a brief "All right," and left the office.

Once by himself his manner changed. The truck he sold the Mahlin Co. had been a veritable nightmare ever since delivery, and the reason—well, he had never been able to figure that out. He knew it was just as well built as a dozen others he had placed. The driver was a man who had been in Mahlin's employ for years—selected for the truck because he was handy with machinery. It couldn't be his fault unless—

Mahlin was wrathful when Tomlinson arrived on the scene, naturally. It had been a steady succession of mishaps ever since the firm bought the truck, and he was getting toward the end of his patience.

"I'm going to take a ride around with your driver this afternoon," announced Tomlinson. "I want to see just how the truck works."

"Go ahead, amuse yourself just as much as you like so long as you keep the thing running," grunted Mahlin.

"And remember," cautioned Tomlinson, "the driver is not to know who I am; a prospect, maybe."

The driver proved to be a wiry, high-strung fellow named Tom, the kind whose manner immediately suggested the wisdom of putting a governor on the throttle before turning the machine over to him. A trouble shooter from the service station had fixed up the difficulty of the morning.

"I suppose you've got to know this truck pretty well by this time," remarked Tomlinson, casually, after they had jogged along for some time at a rate several miles an hour in excess of the safety limit.

"You bet I have," was the proud rejoinder. "There isn't a nut or a bolt in this job that I haven't had out and examined. I'm naturally fond of machinery—a born tinkerer, you know—and there isn't anything in that line I can't do. I've had the engine and the transmission apart to see if they were all right. You never can tell what an agent is handing you, and



"We have practically rebuilt that truck twice—and at our own expense."

there's so much you can't see from the outside. Do you know, two days after I had the engine apart one of the cylinders got scored so badly it put the motor on the hummer?"

Tomlinson remembered the aftermath of the incident, although up to this time he had had no inkling of the cause.

"I found a bit of play in the forward universal joint before I'd run the truck a week, and I took that apart and fixed it.



"There isn't a bolt or nut in this job that I haven't had out and examined."

"There's something to be done every little while. The boss puts up a holler because the truck isn't running all the time, but I stall by telling him it is the fault of the truck—that it isn't any good."

"Isn't it?" queried Tomlinson.

"Oh, yes; it's all right, or will be when I get it properly adjusted. Of course, it takes time, but I'll get it whipped into shape. Leave that to me."

"I should think it would be easier for you to run the truck into the service station when anything goes wrong than to try to do it yourself," ventured Tomlinson.

"Maybe it would, but I like to putter around with machinery, so I do it."

Little by little Tomlinson led the driver out during the afternoon ride. At 4 o'clock he was in possession of enough evidence for a half dozen cases such as this. Whereupon he again repaired to the Mahlin office.

"Well, what's happened now?" grunted Mahlin. "The truck must have broken down and you walked back to get here so quick. I suppose you are ready to convince me that it is all right."

"I am ready to convince you that the trouble is with your driver rather than the machine," asserted Tomlinson.

He related at length the afternoon's conversation, and the disclosures made by Tom.

"What you want to do is call him in and tell him to keep his hands off the truck until it won't run any more, and then go to the nearest telephone and call us up," he said, in conclusion.

"But I picked Tom out as peculiarly fitted for the place of driver," protested Mahlin, "he's so handy with tools and at fixing things."

"He's a fixer, all right," agreed Tomlinson. "That's his chief occupation, apparently. Instead of driving the truck he

insists on fixing it when there isn't anything to be fixed. He has tinkered until, if we hadn't kept after it so close, you wouldn't have any truck at all. A tinkerer is the most expensive article you can have around the place when there's any machinery involved. We've found that out to our



"What you want to do is call him in and tell him to keep his hands off the truck till it won't run any more."

sorrow more than once, and here's another case. There are more good trucks ruined because some crazy genius wants to see what makes the wheels go around than there are worn out in actual service."

"I never thought of it in just that light before," admitted Mahlin. "It sounds reasonable enough, too, when you come to figure it out. Let me tell you right now that there isn't going to be any more trouble on that score so far as we're concerned. It's too expensive an experiment."

"Here's hoping," said Tomlinson, earnestly. "I only wish that a lot of other truck owners might be brought to see the light as you have. It would be the best thing that could happen all around, for believe me, there are plenty of them in the same boat you were without knowing it."

## DOES NOT BELIEVE IN SERVICE BY THE DEALER

By C. P. SHATTUCK

**T**HAT the dealer is up against it because of the overhead expense involved in the selling of commercial cars, and that selling trucks is very difficult, because in all cities mechanical transports are not run on a paying basis, is the opinion of Mr. Clodio, of Clodio and Engs, 12 Central Park West, agents for the Kissel-Kar line, including pleasure vehicles. Mr. Clodio does believe, however, that the merchandizing of trucks could be made profitable from the dealer's standpoint and a paying investment for the purchaser under conditions dissimilar from those now existing.

"The public in general has been made to believe that trucks are not expensive to operate, and many misunderstand the costs of trucking under local conditions. Many business firms purchase gasoline trucks which are not adaptable in the city, because the majority of the hauls are short," said Mr. Clodio. "The brewers who early adopted the mechanical transport, buy right and operate at one third the cost of maintenance as does the average buyer. Certain lines are not adaptable to the truck. Conditions here do not favor economical maintenance of the gasoline truck because of the police regulations. As a result the driver cuts down the oil supply and burned out bearings are common, because the driver does not wish to be penalized on account of oil. Mr. Clodio stated that there is a lack of systematic operation of trucks, that a car will be 25 per cent. overloaded one day and idle the next, and if the trucks fails to stand up, the dealer is blamed.

Mr. Clodio does not approve of the present system of service nor does he

think it means the successful operation of trucks. He is in favor of a central service station conducted on a co-operative plan. He suggested that twenty or more owners of a make could combine and obtain efficient service at a considerably less cost. The mechanics would be specialists and the system would afford opportunity for inspection, which is not always possible under the present conditions. "The guarantee does not mean anything," said Mr. Clodio. "The buyer and the factory should co-operate with the dealer if trucks are to be successfully operated. As to contracts with the factory, the maker should take interest in the service station and allow the agent a larger discount on the parts. The cost of parts are too high. There is no uniformity when a certain unit may be listed at 10 per cent. of the selling price of the truck."

The employment of unskilled drivers, none too well paid, is another factor that mitigates against the successful operation of commercial cars, according to Mr. Clodio. He believes that the men should be better paid, and thoroughly taught as to the car, not allowed to handle a machine costing thousands of dollars after a few lessons in driving. He also suggested a plan of selling truck service by the manufacturer and the agent on the same basis tires are sold, on service. In other words, it is proposed to sell the truck on the basis that it is good for three years' service and to charge off a certain percentage each year for depreciation, repairs, etc., the buyer paying for the service. At the end of three years the manufacturer is to take the truck from the agent whose commission for selling the service is to be a certain percentage. Mr. Clodio believes that the principles of this plan could be successfully applied, that a service basis would be more satisfactory in the end, and that service in the meaning of the word service, would be greatly improved.

In common with some dealers Mr. Clodio is of the opinion that some agents are prone to sell a man a truck without analyzing the conditions under which the car is to operate, and that such methods are hurtful to the industry as a whole. He believes that salesmen must be specially trained, to be as capable as an engineer who advises the selection and installation of power plants in a factory, for transportation problems cannot be left to untrained subordinates if the best interests of the truck industry, the agent and manufacturer are to be served. Mr. Clodio does not believe in talking the cost of horse delivery to a prospect, as the cost of the truck is more than that of horse-drawn equipments. "When a salesman tells a prospect that a truck will do the work cheaper than horses, it is, as a rule, a detriment to sales. I believe that there is a big future for the commercial car, but the present methods must be greatly improved. When the government establishes a subsidy as has France and Germany, it will be found to be of great benefit to the truck industry, and one of several reasons is that the cars subsidized must be maintained in a perfect mechanical condition."



**T. & E. Cumpson, Wholesale Grocers of Buffalo, N. Y.**

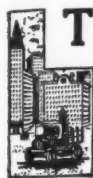
Have found that they are able to operate a three and a half ton G.V.T. at a cost of \$.105 per mile. To operate a team, covering the same mileage, etc., cost them \$.38 a mile. In other words they are saving \$.275 per mile.

The CCJ has most advertisers because it gives them biggest returns

# Accounting Methods in the Buying and Handling of Materials for Automobile Factories, Accessory Makers or Jobbers

By WILFRED G. ASTLE

[Editor's Note. This system is suggested in full, but can be abbreviated to suit the requirements of smaller firms. We shall be glad to have suggestions as to improvements on same.]



**T**HE handling and care of materials in every modern business has become a matter of very great importance, for it is now being realized that material is nothing else but a direct representation of cash and should be treated and handled as carefully as if it were actual cash, therefore, the accounting work should be of just as much importance to the economy and efficiency of the organization as the other parts of the system.

The scheme of organization, which will be outlined in this article, provides for the closest co-operation between the stores department and the purchasing department. The storekeeper should be held responsible to the purchasing agent for the proper care and handling of the material in his charge, but should report to the general auditor or comptroller on all matters in connection with the accounting for the materials.

This system can be applied by practically any automobile manufacturer or even jobber, although the forms might have to be altered to fit the conditions as found in the individual establishment.

## Form No. 1. General Requisition for Supplies

To make intelligent purchases the purchasing agent should be guided and directed by specifications in every instance. The storekeeper should be responsible for the specifications drawn up from which the purchasing agent is to act, because he should be familiar with exactly what is required.

As material of any kind is required it should be indicated to the purchasing agent through the medium of this general requisition for purchasing. Each department should be supplied with its own requisition blanks, and, to make them more distinctive, a different color and a letter can be adopted for each department.

These requisitions should be made out in triplicate. The original and duplicate going to the storekeeper and the triplicate being retained as a record of material ordered. No matter by whom these requisitions are made they should first be passed to the storekeeper, who should check them to determine whether he has or has not any or all of the materials required on hand or on order, after which he should pass the original to the purchasing agent, and retain the duplicate for his records. This mode of procedure gives the storekeeper absolute control of the amount of materials on hand.

In every case these requisitions should state the purpose for which the material or supplies are required as well as by whom wanted, and material of two different classes should not be listed on the same requisition.

## Form No. 2. Low Stock Report

This is another form of requisition which should be used by the storekeeper to the purchasing agent when material is required for stock.

Every article of material in stock should be given a low limit, and when this limit is reached, the storekeeper should make out a report to the purchasing agent, showing the low limit and the quantity in stock. Before replenishing his supply of any ma-

terial, the storekeeper should consult the head of the department using the material to ascertain if any changes in the specifications will be made. Failure to do this sometimes causes the storeroom to become overstocked with obsolete parts or material that has become useless on account of changes in design or models.

## Form No. 3. Request for Quotations

The purchasing agent, upon receiving requisition for material on either form No.

Form No. 24		REQUISITION FOR SUPPLIES		D 33507
To the Purchasing Agent—				
Please supply the following, required for				
and charge Acct. W.O.				
P. Agent's Order No.	Quantity	Description	For use of Purchasing Dept.	
For Dept.				

## Form No. 1. General Requisition for Supplies

LOW STOCK REPORT.				
Mr. Storekeeper.			Date.	
The following items have reached the low limit.				
Inventory Clerk.				
Low Limit.	On hand.	Material.	Remarks.	

## Form No. 2. Low Stock Report

This is not an order but a request for quotations.	
(Name of Company)	
Purchasing Department.	
To	Date.
Please return this sheet, stating how soon after receipt of order, and at what prices and discounts and terms you can furnish the following articles.	
(Name of Company)	
Per. Purchasing Agent.	
Description of Article.	Prices and Discounts.
This is not an order but a request for quotations.	

## Form No. 3. Request for Quotations

**Follow-up-copy.** Should be retained by the purchasing agent to follow up the order. It should be filed first in a tickler, or date file, back of the date when an acknowledgement is expected. If no acknowledgement is received, the dealer should be

Receiving Copy. Should be passed to the receiving clerk, who should file it according to the name of the dealer. When the material is received, he should check

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Upon receipt of this form the purchasing agent will bring together all papers dealing with the transaction, viz., original copy of receiving report; copy of purchase order; original copy of general requisition for purchasing and invoice from the dealer.

when he should file the two copies, that is, the copy of the general requisition for purchasing or the low stock report, according to the kind of material, and the copy of the purchase order according to the name of the dealer, this will enable him to have a cross index to these orders.

The storekeeper should hold his copy of the general requisition for purchasing and low stock report, until he receives his copy of the purchase order covering the material.

As soon as the original invoice for such material that has been checked, and entry made on the stores ledger, the storekeeper

**Form No. 8 A. Stores Record, Showing Only Units**Form No. 8B. Stores Record, Showing Both Units and Values

The CCJ has most readers because it gives most information

approved. This form should show the use to which the material will be put, and the name of the operating expense or other account chargeable. After requisitions have been filled by the store clerks they should be passed on to the stock ledger clerk, who should number each requisition consecutively and enter each item on his records, after which he should pass the original copy on to the accounting or cost department, and retain the duplicate to be filed under the account chargeable.

Before a system of stock records can be successfully installed, a complete inventory must be taken, and from this is formed the basis on which the records are founded. When once this inventory is taken and properly recorded, it is possible to install and maintain a system which will make it unnecessary to take an inventory of all the material at any one time.

The American Brewers and Bottlers Specialty Co., of Milwaukee, Wis., state that they do not manufacture complete gasoline trucks, as is apparently believed by many in the trade, as shown by letters which they are receiving. This firm manufactures simply automobile parts, such as fenders, hoods, gasoline tanks, etc.

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# Marshall Field's Motor Fleet Proves Indispensable

By WALTER A. BERMINGHAM

**F**OR the purpose, for which the Marshall Field & Co.'s motor truck fleet is in service in Chicago, the transfer of merchandise, it is the greatest in the world.

Motorization began with the addition of a Knox commercial car to their vast delivery system, in the spring of 1908, followed by a Chicago built combination electric and gasoline motor vehicle, long out of service, with even the maker's name forgotten. In the spring of 1909 a three-ton Packard (still in excellent condition) was placed in commission, in the fall of the latter year two Frayer-Miller delivery motor wagons were an air-cooled motor experiment aiding to make the service, what at that time would have been called a motor truck fleet. About that same time four 3-ton and one 1500-lb. Packards, were going into commission, really made a motor truck fleet and the real beginning with a motor system in competition with the horse. In the spring of 1910 three White motor trucks of 1½ tons capacity became an additional part of the equipment, followed, in a short period, by four more Whites of the same capacity, quickly followed by the purchase of three 3-ton White motor trucks.

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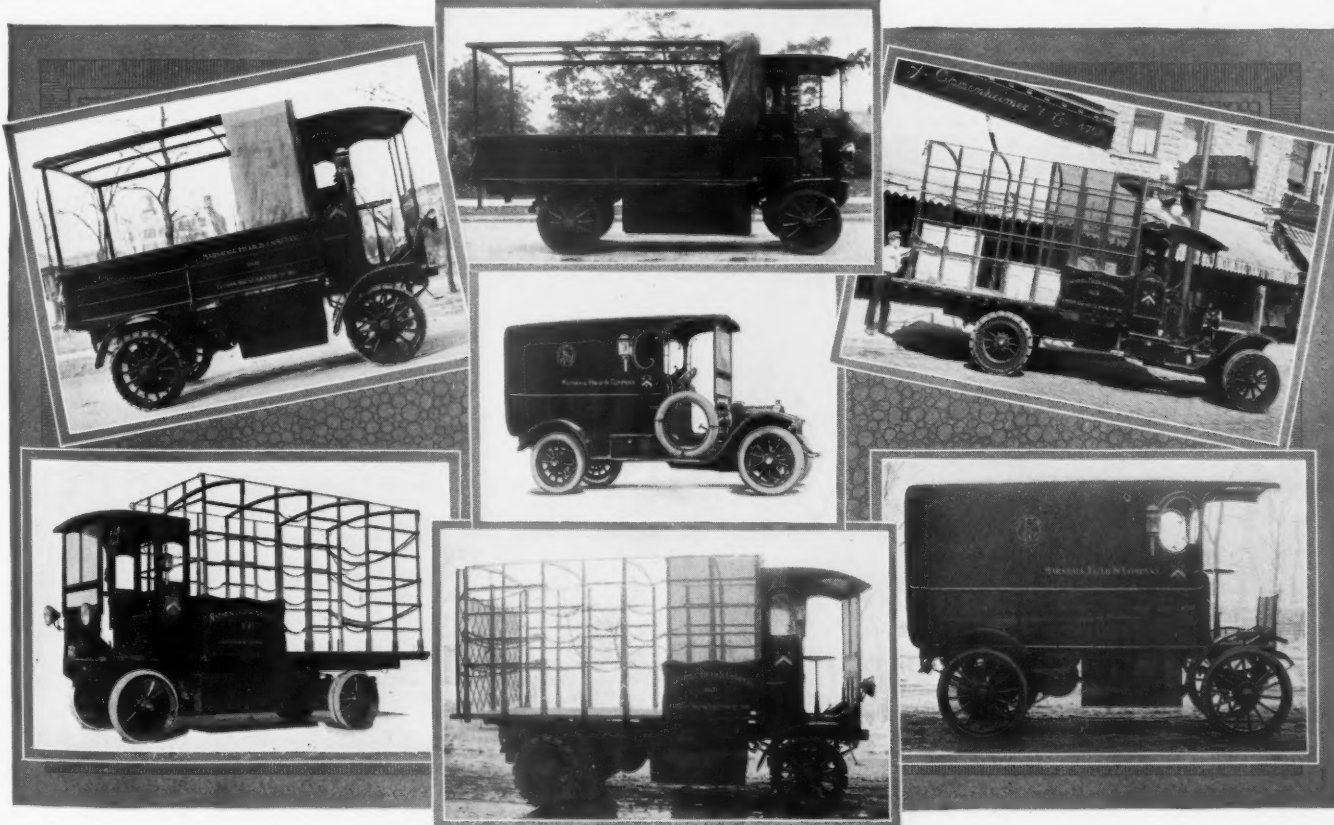
which seems to have been their only experiment, and three White 3-ton motor trucks, every motor truck from the beginning is now in daily service. The 3-ton Whites were unusable because their 42-in. iron wheels interfered with the use of stakes.

Increasing, little by little, until at present the gasoline motor truck service is augmented to seventy-one motor vehicles, among them—White, seven 1½ tons each and eight 1500 lbs. each; Packard, nineteen 3-ton, furniture body; eleven 3-ton, four 1½-ton and eight 1500 lbs.; Mack, three 1-ton; Ford, ten; Velie, one 2-ton; Federal, one 1½-ton, and one Abbott-Detroit touring car.

A feature of the gasoline motor truck service, is the care, knowledge and judgment in buying, for, beginning as early as they did in the development of the motor truck, no expensive mistakes were made in increasing the gasoline truck equipment, as practically every unit of the service since the initial part, is now in constant service through the maintenance of a complete repair plant, a machine shop and stock room at 716 East Fulton Street, where at present there are nine motor trucks on the floor, all of them for minor repairs attended to by a shop force of five men.

## Gas Trucks Fifty to One Hundred and Ten Miles a Day

The gasoline motor trucks are employed on trips from 50 to 110 miles daily, as they are the feeders, or supply trucks to the various sub-stations, where either a motor delivery or horse-drawn service receives the packages of the thousands of daily customers of the immense retail establishment of Marshall Field & Co. The purchases are packed in enormous trunks, in their packages of different sizes and weights, in the retail store, loaded from platforms, in a covered passage on the street level—it is really a wide street—on the pavement level, 36 ft. wide, the length of the block extending from Washington to Randolph Streets (the northern and southern block boundaries, respectively of this department store. State Street on the west and Wabash Avenue on the east are the other boundaries). The passage is two stories high with an upper clearance sufficient for all loads. It runs through the middle of the building, debauching to a greater width in its middle level enough to permit loading at least twenty sub-station supply-motor trucks at a time, and leave the main passage clear for traffic during the operation. There is room on either side to park numerous



Types of Bodies Used by Marshall Field & Company

Upper row, left to right: G. V. Electric furniture car, four thousand pounds capacity; a Walker Electric truck, four thousand pounds capacity, twenty-two of which are being operated for furniture delivery; a White, three thousand pound truck, seven of which are a part of the fleet. Center: A White truck, fifteen hundred pounds capacity—there are eight of them in the fleet. Lower row: A type of Walker Electric employed in heavy transfer service—the two trucks in this service are seven thousand pounds capacity; G. V. Electric truck, three and a half tons capacity; another G. V. Electric, two thousand pounds capacity, used for merchandise delivery.

The CCJ leads in circulation, advertising and prestige

should file under "orders filled" all papers pertaining to the transaction in his department under the proper purchase order number and should keep a record of the names of the dealers that the orders are on.

### Disposition of Purchasing Agents' Copies

All purchase orders should be filed alphabetically, according to the name of the dealer, and through which, by means of the indicating tabs, deliveries will be followed up automatically.

Attached and filed with them should be the original of the general requisition for

terial he has on hand, but what he has on order. The heading "ordered" is used for memorandum purposes only. As soon as the storekeeper receives his copy of the purchase order, he should have entered its number, date, quantity ordered, requisition number, as well as the name of the dealer on whom the order is placed, and as material is received from the copy of the receiving report he should have entered under the heading "received" the date and quantity received, and show under the heading "on hand" the number of units then in stock.

[illegible]

### Form No. 9. Requisition for Material From Stockroom

purchasing or the low stock report. Then as correspondence pertaining to this particular purchase order is received, it should be carried in the same folder in the file.

After the material has been received and the invoice approved and passed to the accounting department, the purchasing agent's copies of these various forms should be removed from the current file and placed in the regular filing cabinets under the classification of that particular firm's name and in the purchase order section or folder.

### Form No. 7. Invoice Approval Stickers

Immediately upon receipt of invoices this gummed sticker should be attached to the face of each for the purpose of indicating the approval of the various authorities and the distribution number or account to which the material is to be charged, and then delivered to the purchasing agent, who, upon receiving the invoice, should check it with the papers previously mentioned, and if correct, approve and pass to the accounting department, placing the other papers in the filing basket to be filed in the permanent file.

## Form No. 8. Stores Record

This form is provided to show the complete status from a storekeeping point of view of all material bought from the outside. A separate sheet should be provided for each different kind of material, with full description of the article, its location, maximum and minimum quantities, and should provide such a record as to enable the storekeeper to know not only the ma-

As properly signed requisitions are received calling for delivery of material to the various departments they should be entered under the heading "disbursements," showing the quantity issued and the number of the order or account chargeable on which they are issued, and at such times a new balance should be brought out into the "on hand" column, so that at all times will be shown in this column the actual quantity on hand in the storeroom.

A second heading for memorandum purposes can be added to this form with great advantage, under which should be entered

Form 7-10000-7-00

Date, \_\_\_\_\_ 19\_\_

**TO THE STOREKEEPER:--**

No. \_\_\_\_\_

Please charge the following material to stock, and credit the account specified:

QUANTITY	MATERIAL RETURNED	COST	WORK ORDER No.	CREDIT TO ACCOUNT

**Form No. 10. Material Returned to Stock**

the amount of any material that may be called for by orders under way and which may be delivered when called for by requisition. By using this extra column which can be headed "reserved" it will enable the storekeeper to intelligently forecast his future requirements and issue necessary requisition to keep up his stock.

## Form No. 9. Requisitions

As material is required from the store-room it should be requisitioned out on this form, which should be properly signed and

approved. This form should show the use to which the material will be put, and the name of the operating expense or other account chargeable. After requisitions have been filled by the store clerks they should be passed on to the stock ledger clerk, who should number each requisition consecutively and enter each item on his records, after which he should pass the original copy on to the accounting or cost department, and retain the duplicate to be filed under the account chargeable.

## Form No. 10. Material Returned to Stock

When a foreman receives an order to manufacture a certain article, he estimates the quantity of material required and draws it from the stores. He does not always estimate the exact quantity; he may be short or have material left when the work is completed.

Unless this material can be used immediately on another job, it should be returned to stock, with a report to the storekeeper, showing the order number for which the material was drawn, this being the production or shop order number.

When the storekeeper receives unused material and this report he will enter the quantity on the stock records under the head of receipts, and then pass the report to the accounting department.

## Conclusion

Before a system of stock records can be successfully installed, a complete inventory must be taken, and from this is formed the basis on which the records are founded. When once this inventory is taken and properly recorded, it is possible to install and maintain a system which will make it unnecessary to take an inventory of all the material at any one time.

## DO NOT MAKE COMPLETE TRUCKS

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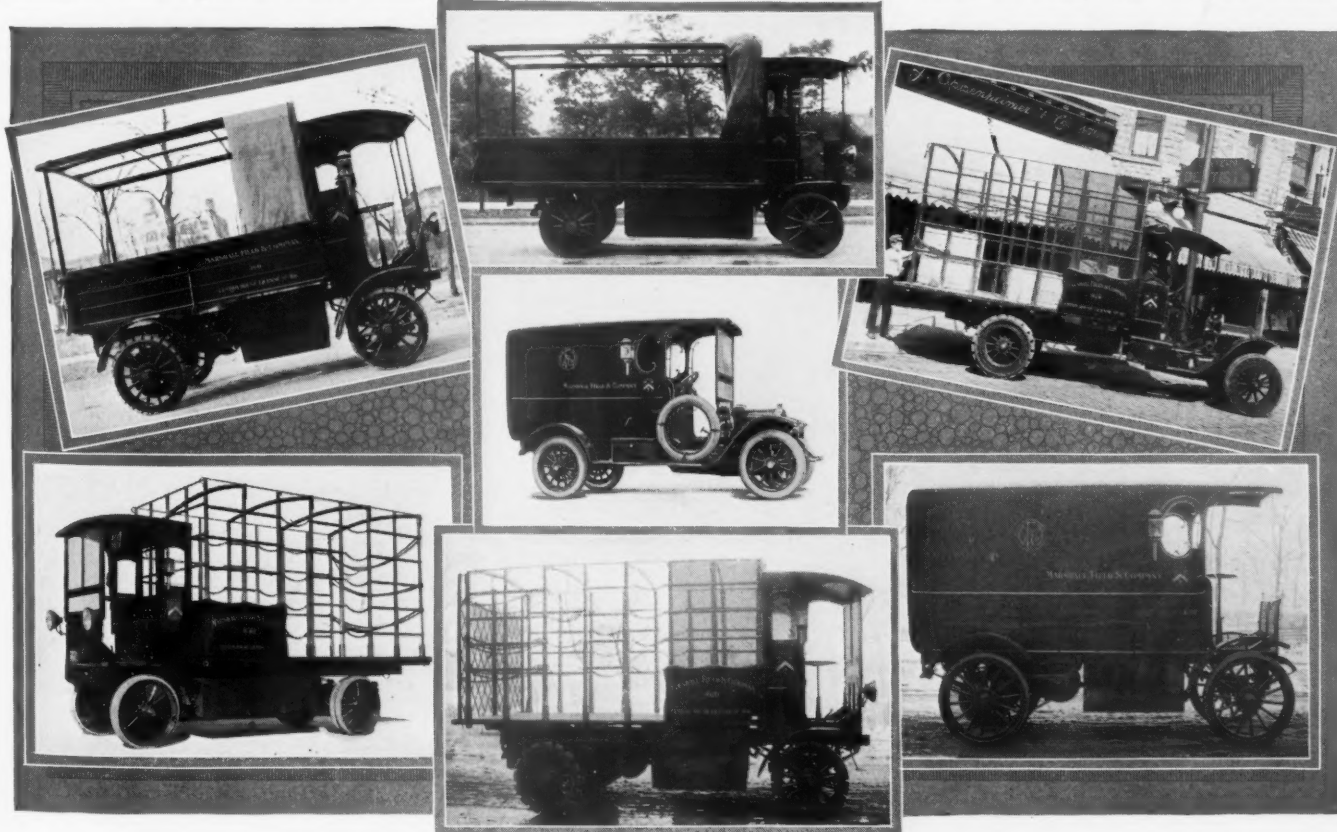
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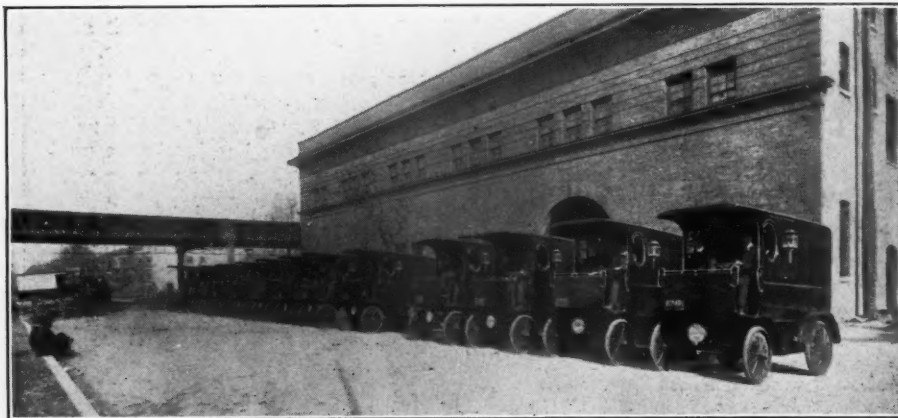
The CCJ leads in circulation, advertising and prestige

shoppers' motor cars and for the receipt of goods at the platforms. In the latter transfer service, the horse is still much in evidence. The package-filled trucks are loaded on  $3\frac{1}{2}$  ton capacity gasoline motor trucks, and relayed to sub-stations. All assembling, routing and copying is done in the store. The sub-stations are covered three times daily. This service would be impossible with horses, as even the space necessary would make a horse service prohibitive, hence no horse-drawn vehicles are used by Marshall Field & Co., retail.

With no connection whatever with the retail service, the wholesale equipment, alone, for thirty vehicles necessitates the use of eighty-eight horses.

Those  $3\frac{1}{2}$ -ton motor trucks, respectively, leave the main retail store, and with one exception, are the mode of supply, making three round trips daily to the following substations, viz.: 63rd Street and St. Lawrence Ave.,  $7\frac{1}{2}$  miles; 44th Street and Cottage Grove Ave.,  $4\frac{1}{2}$  miles; 419 South La Salle Street,  $\frac{3}{4}$  mile; 716 Fulton Street, 1 mile; Kilpatrick Avenue and Lake Street,  $5\frac{3}{4}$  miles; Montrose and Ravenswood Avenues, 6 miles; the exception is 1836 Maple Avenue, Evanston, Ill., 12 miles, where but two daily trips are made. These distances are all one way and are each timed to leave the main store at 12 m., 3 p.m. and at 6.30 p.m. with goods for transfer to the motor delivery service to reach their destination at an early hour on the next day. An example of the promptness of this supply is shown on a seven and one-half mile haul from the main store to the sub-station at St. Lawrence Avenue and 63rd Street. A truck makes the out trip in fifty minutes with even the disadvantage of driving through the length of the eastern boundary of the "Loop." This service is a marvel of efficiency, even with the handicap of overloads especially in the economy of garages or sub-stations and the remarkable service of the gasoline motor supply trucks.

The gasoline commercial car is the sole delivery service for from two to three round daily trips to suburban points, for example, two trips are made to Evanston, a minimum, one way, of 12 miles; one round trip covers Indiana towns, as Gary, 30 miles distant from Chicago. Deliveries are made on the north shore as far as Lake Bluff, 30 miles, and on the south and west, 24 miles.



**A Row of Electrics**

Part of Marshall Field & Company's fleet of 219 Walker Electric motor trucks. They are operating 170 Walker one thousand pounds capacity parcel delivery electric motor vehicles

The gasoline fleet consumes annually, based on the present equipment, approximately 110,000 gallons of gasoline, and estimating this at \$.10 per gallon, a cost of \$11,000 annually for fuel. Lubricating oils annually are used to the extent of about 8000 gallons, which at an average price of \$.25 per gallon, amounts to \$2000 annually.

The large capacity motor gasoline trucks are equipped with Kelly-Springfield block tires, which are giving 12,000 to 13,000 mileage. From Swineheart tires, which also are part of the equipment, an average of 11,000 miles, although, exceptionally, as great as 18,000 to 20,000 miles has been



**Two-Ton Velie,  
With Large  
Body, Used by  
Marshall Field**

obtained. Tires of the block type cost approximately \$40 each, for motor truck front and \$100 each, for rear wheels. On  $\frac{3}{4}$ -ton trucks, Kelly-Springfield and Pennsylvania Vacuum Cup pneumatics are in use, averaging 5000 mileage and a single tire cost of \$35. Both Bosch and Eise-mann magnetos give satisfactory results.

Both open and closed furniture bodies are installed on 3 ton chassis, panel bodies, on light delivery or touring 1500 lbs. chassis, panel bodies.

#### The Electric Fleet

The major part of the motor truck service is electric, as practically all Chicago within the city limits is paved. The electrics operate from seven sub-stations or garages, where they receive goods for mainly Chicago; that is, city delivery.

The fleet consists of 192 Walker electrics, with twenty-seven more ordered for immediate delivery, and seven General Electrics, employed in delivering the retail sales.

#### Some Do Work of Four Wagons

On some routes two electrics are doing the work of three wagons, and on others two machines accomplish results equaling that of four wagons. At one sub-station, formerly a base for seventeen wagons, they are now employing twelve electrics. Electric vehicle capacities are 3, 2 and  $1\frac{1}{2}$  tons, with light parcel delivery cars of 750 lbs. The first electric was placed in commission in 1910. The bodies, by

William Erby & Sons Co., Chicago, are of furniture van types, both closed and open; panel bodies are used on the 750-lb. Walker Electric chassis, and stake bodies on the  $1\frac{1}{2}$ -ton Walkers.

From the garage, 4343 Cottage Grove Avenue, current is supplied daily, or, if necessary, more frequently to thirty Walker Electric commercial cars of  $1\frac{1}{2}$  and 2 tons capacity, and to the entire electric fleet. The charging system is General Electric, two rectifiers making current from a.c. to d.c. through transformers of 75 h.p. Philadelphia and Vol Kar lead batteries are the electric equipment. This sub-station, garage, is a two-story brick structure, the second story available for vehicle storage by a hydraulic elevator, installed by the Pitt Engineering Co. Six garages in all are used, and all are similarly equipped.

On Wentworth Avenue, at 70th Street, the finishing touches of the cement workers and electricians are nearly completed on the new brick, steel and cement garage, almost ready to go into commission. The structure is 174 ft.  $7\frac{1}{2}$  in. deep, by 83 ft. 6 in. in width. The front is two stories, 74 ft. deep by the width of the building. The second story will be utilized for rest, club and toilet-rooms, with office space in the southeast corner. The main floor, or garage proper, is an entirely unobstructed area, the curved roof is supported by steel trusses, the floor is cement, four skylights on both sides of the roof afford top lights and eight windows on the south wall, side light. It is particularly high studded, fire-proof and steam heated.

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## THE NEW MERCURY ELECTRIC TRACTOR AND HAULAGE SYSTEM

By CHAS. P. ROOT

**T**HE Mercury haulage system, in brief, embodies the use of electric power for hauling, the separation of the power unit from the load-carrying body and the placing of all loads upon platforms with wheels; that is, upon inexpensive trailers until final disposition.

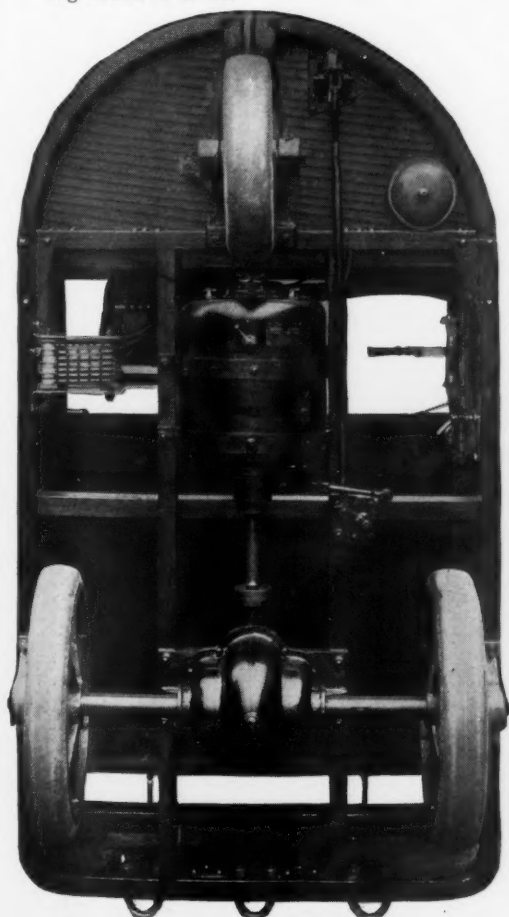
That the system is fast coming into general use among railroad and express companies and large mercantile houses is shown by the fact that the American and Wells-Fargo express companies and such immense mail order houses as Montgomery, Ward & Co. and the Sears-Roebuck Co., have been using the system for some time.

### Trailers Track Accurately

The chief factor is that the tractor, or electric engine, can haul as many trailers as may be attached, and no matter how many turns or bends are made, the trailer will follow the tractor without variation of wheel track of more than about 6 in., thus enabling short turns to be made, as well as reverse curves, so that any number of trailers may be employed.

### Details of Tractors

The tractor is a compact little affair, with a wheelbase of but 40½ in., an overall length of 71 in., and a width of 39 in. The height is only 38 in., and the weight 2120 lbs. with a lead battery, and 1850 lbs. with an Edison supply of current. Because of the fact that a single wheel is used for steering, the turning radius is 57 in.



Note Centrally Located Motor With Direct and Worm Drive

The frame is of 3 in. channel iron, riveted and welded and so made as to appear to be one piece. A longitudinal sub-frame is employed to carry the motor, and above the sub-frame the battery carrying platform is suspended on four arms, with heavy coil springs above and below each arm, thus removing the upward or downward jar that may accrue, for there are no springs, for

the right side exposes the controller and wiring, which is a single unit. On the left side is an automatic brake which is in operation when the driver is not on the car.

Coupling attachments are on the main frame at the rear of the tractor, and a variety of these are provided for. In this connection it is well to state that the draw-bar pull is given at 900 lbs.



### Mercury Industrial Trucks Handling Baggage at Railroad Station

The little vehicle is here shown pulling a long line of trailers largely loaded with milk cans. It can haul baggage on the crowded passenger platform, as the cars, being fastened together with solid couplings, are under perfect control of the operator. They show great economy in this work over former methods.

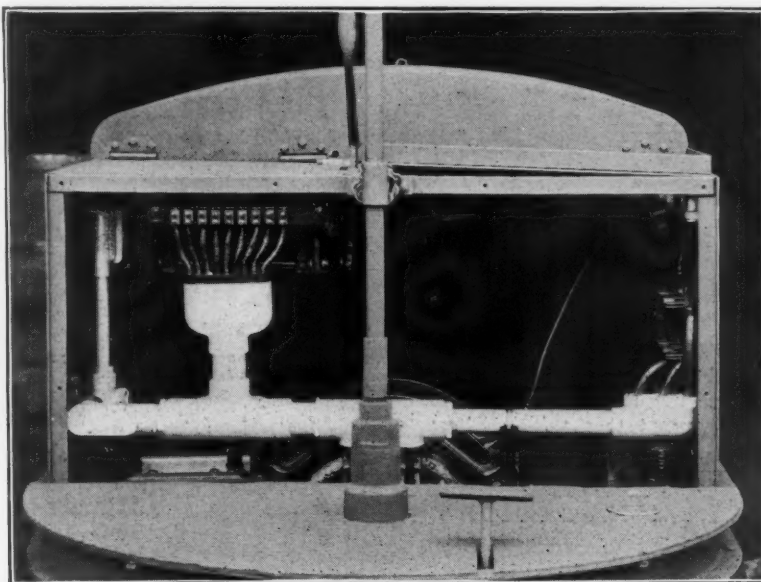
the tractor carries no load, the bearings being attached to a bracket, which is in turn fixed to the frame.

The rear wheels are the drivers and are 20½ in. in diameter, with 3½ in. solid rubber tires, while the front or steering wheel is but 15 in. in diameter and has the same size tire. The wheel bearings are of the roller type, but all other bearings are balls. The front or steering wheel is supported by a steel fork, mounted on cup and cone bearings and is turned by a simple hand lever directly attached, with no gears or drag link.

The motor used is a Westinghouse, 32 volt, and the battery either a sixteen-cell lead, seventeen plates Ironclad Exide or a 30 volt A-6 cell Edison. The controller is directly under the operator's seat, with the control lever at his left. The latter is so arranged that it is locked by means of a plate, which may be raised when the car is ready to be started. Raising the seat on

### No Time Lost

In the handling of the tractor, it is customary for the operator to pick up a long line of trailers, which are properly made up as to destination, and to haul them to this or that point and drop them off as needed, even without stopping the train. The trailers—for instance in a freight house—are then pushed into a car and unloaded, while the tractor goes on and picks up a train of "empties." It is claimed with the exception of the time used for coupling and uncoupling, not a moment is lost, as in the case where the carrier type of truck is used; it is also maintained that battery maintenance and renewal current will run about \$.03 per kilowatt hour and that the tractor may be operated for \$2 or less per day. This tractor is manufactured by the Mercury Mfg. Co., 4110 S. Halstead St., Chicago, which is also the maker of the two-cylinder air-cooled Mercury trucks.

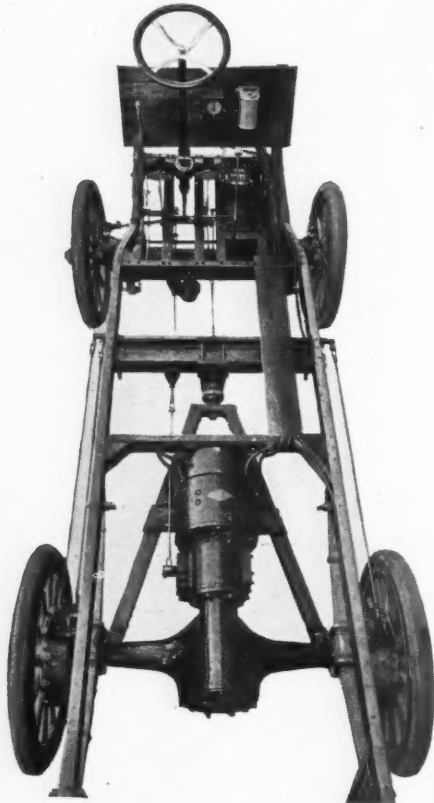


Accessible Controller Under Seat, Showing Workmanlike Wiring and Connections

The CCJ has most readers because it gives most information

## BAKING CONCERN BUILDS ITS OWN TRUCKS TO MEET EXCESSIVE ROAD CONDITIONS

Not being able to obtain satisfactory demonstrations from electric truck manufacturers, the Purity Baking Co., of St. Paul and Minneapolis, set about building its own trucks. The officials of the company realized that if electrics were to be employed they must differ materially in design and construction from those demonstrated. It was conceded that for ease of operation, sanitary conditions and economy the electric was the truck and with this in view an experimental electric truck was built. Within ninety days the truck was completed and placed in service, and on August 15th last, had been in op-



**Chassis Plan View of the Purity Company's Electric**

Note the rear axle unit, which is of worm type,  $13\frac{2}{3}$  to 1 ratio, coupled to a sliding-gear transmission that permits of a  $27\frac{1}{3}$  to 1 ratio.

eration two and one-half years, and run 24,460 miles.

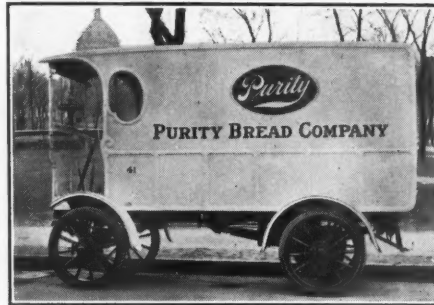
After a thorough test over roads, which during certain seasons, were all but impassable, and other conditions peculiar to this latitude, materials were ordered for thirty-nine additional electrics, all of which have been completed and placed in service and for appearance, consistent operation and efficiency, have exceeded all expectations.

Seven trucks displaced seven horse-drawn vehicles, requiring thirty-two horses, four horses (two teams) to a vehicle, alternating, using each team three days a week; the routes varied from fifteen to twenty-three miles. The remaining electrics were operated on new routes ranging from twenty-three to forty-eight miles, an average of 31.9 miles for each truck.

The battery installation consists of 120 cells of A-4 Edison. A 140-volt motor,

using the regular controller, switch and wiring comprises the power element.

The experimental vehicle was operated nine months, and during that time never lost a trip with the exception of thirty days in the winter, when heavy snow drifts



**One of the Forty Electrics Built and Owned by the Purity Bread Company**

made the roads impassable even for sleighs. Under normal conditions the ampere hours consumed is 110, and the maximum consumption ever recorded was 185 ampere hours.

All rear axles are of the worm type,  $13\frac{2}{3}$  to 1 ratio, with a sliding gear transmission that permits of a ratio of  $27\frac{1}{3}$  to 1. No claim as to efficiency is made for this change gear or transmission, it is nothing more than an expedient, and by its use favors the battery, particularly when it is from one-half to two-thirds discharged and heavy resistance, such as deep snow or sand or heavy grades are encountered.

This change gear practically cuts the ampere draw in two, and when conditions are met such as are mentioned above, one can readily see just how such a device works to advantage.

The weight of the 2000-lb. capacity truck is as follows: Body, 1585 lbs.; battery, 1260 lbs.; chassis, 2690 lbs.; total weight, ready for service, 5535 lbs.

The body is 106 in. long, back of the driver's seat, 46 in. wide and 5 ft. 7 in. high, all clearance measurements. The wheelbase is 102 in., tires,  $36 \times 3\frac{1}{2}$  in. front,  $36 \times 4$  in. rear; springs,  $40 \times 2\frac{1}{4}$  in. front,  $46 \times 2\frac{1}{4}$  in. rear.

The 1000-lb. capacity trucks are fitted with special side door bodies, weighing 1090 lbs. The battery weight is 900 lbs. and the chassis 1940 lbs. making a total weight of 3930 lbs.

Wheelbase is 96 in., tires,  $34 \times 3$  in. front,  $34 \times 3\frac{1}{2}$  in. rear; springs,  $40 \times 2$  in. front and  $46 \times 2$  in. rear.

The labor cost of all repairs, maintenance, charging, washing, and re-varnishing once a year is \$108 per car per year. The tire cost in the city is \$.01125 per car mile, and on cars operated on country roads the cost is \$.0125 per car mile. The average cost of repairs and upkeep of every nature, charging current, interest and depreciation, is \$655.58 per car per year.

## TRUCK USED AS A DEPARTMENT STORE

W. Frels, O'Leary, Ia., has purchased a Little Giant Truck, which is stocked with everything from a needle to a suit of clothes. Instead of requiring his customers to come to him, he drives into their yards, backs the truck up to the door and by lowering the sides of the truck exposes a department store. Although a great deal of merchandise passes through this portable store, it is never empty; as fast as the merchandise is disposed of, farm products are either purchased or exchanged and loaded into the truck for city trade.

F. S. Hubbell, milk dealer in New Haven, Conn., has saved \$2274 in nine months by using a 2-ton Pierce Arrow.

Zeiter & Lamson Truck Co., Chicago, capitalized at \$100,000 has been formed to manufacture and deal in motor vehicles, wagons and carriages by Harry D. Irwin, Arthur J. Knight and Paul Lavery.



**Largest Cotton Truck**

Constructed for M. Goldsmith & Bro., of Charleston, S. C., by the Gramm-Bernstein Company, Lima, Ohio. This is a 1914-1915 model five-ton chain drive, has a body  $20 \times 7$  ft. and takes a carload of cotton every trip.

The CCJ has most advertisers because it gives them biggest returns

# Truck Performs Marvelous Feat of Hauling Eleven Ton Steel Load Up Mountain Side

By FRANK REED



**H**IS "Jack" Stoner now, all right. Ask any business man in Los Angeles for a list of the successful dealers in motor trucks and he would mention prominently J. A. Stoner, distributor of Mack, Saurer and Republic trucks. Stoner is the business man's idea of a success. He has always been aggressive in pushing his line, but it has been a solid, business-like aggressiveness of the kind you see exemplified in the heads of big business institutions.

But since his conquest of Mt. Wilson and an 11-ton chunk of steel that belonged on top of the mountain, but apparently had no way to get there to take its place in the base of the big telescope which is being erected for the Carnegie observatory, there has been much talk about "Jack" Stoner in the desert and the mining country. There has been much questioning of his deed on the simple ground of experience of the questioners, "It can't be done," they say, and then go on and inquire how he did it.

The representative of *Commercial Car Journal* was there and saw it done. There was no trick about it—no monkey business. It was just a case of making good on the longest, highest, steepest haul with a much larger load than has ever been put on a truck before.

The placement of the steel upon the truck was done with extreme care, bringing the weight largely over the rear axle. Heavy stranded steel cable was used to unite the steel firmly to the bed of the truck, pressure applied by jacks placing the cable under such tension as to eliminate risk of slipping. That is, it did eliminate the slipping, although on such a haul one can never say the risk has been eliminated. The Saurer truck used was one from regular stock. The observatory people had told their dilemma to Stoner, who had supplied them the two Mack trucks which have been in regular service hauling construction ma-

terial for the observatory up the mountain for months, and asked him if he could offer any assistance.

He told them if they would risk their steel, he would risk his Saurer truck on the proposition. They told him to try it. He agreed to make the attempt, with no charge for his services if successful. When the load arrived at the toll house at the foot of the Mt. Wilson road, the husky piece of steel looked its weight. The road sunk under the rear wheels and sprang up a trifle, in a movement that was easily visible, as they passed.

The first few hundred yards of the mountain road brought the truck to a long down grade terminating at the bridge over Eaton Canyon. It picked its way down the steep, winding pitch, crept over the bridge in safety, and started for 9 miles of steady uphill going, on the zigzag gravel road up the face of Mt. Wilson to its summit at 6000 ft. altitude. Grinding up the switchbacks, by the time it had reached the Devil's Elbow, 1000 ft. above the valley, the observers saw that the Saurer had the power to drive the load. The motor is rated at 37 h.p. Grades to the summit average 12 per cent, with short pitches as steep as 19 per cent. At the Devil's Elbow, where the road almost doubles back on itself, making a turn of some 300 degrees in nine lengths of the truck, necessitating turning practically on the turning radius of the machine, a line was let out for a help from the Mack running ahead. With a heavy chain running from the inside spring of the Saurer to the Mack, the two were started together. Up came the front wheels of the Saurer into the air, due to the pull being upward and sidewise, with just enough forward tractive component to give the big truck a start. The line was cast off after a few feet, and the Saurer made the rest of the boarded turn on her own power.

At turnout No. 18 the road doubles back so the outside upper and inside lower boun-

daries are formed by the same vertical ledge, the rise in this loop being about 45 ft. in 80 yds. This is one of hundreds of places that could never have been passed by a string of mules. They would simply have wound themselves up on the hillside, as soon as enough had gone around a bend to leave the remainder unable to move the load. But the truck made this loop without a struggle. The tread of the truck was 16 in. wider than the road, so one wheel had to be down and the other up, or both up on new ground. This added to the risk and difficulty. Above the half-way point the frequency of the turns increased, and a pitch-off would have meant a drop of from 1000 to 2500 ft. The sun shone brilliantly against the trail, tending to heat the motor and dazzle the driver. At one point on the east cliff Stoner had to make a quick stop when he was getting a help from the forward trucks. A foot or so more and he would have been over. Hitching two trucks together and starting them in different directions, as had to be done on a road that was not straight for the length of two trucks and a chain, was too risky to try oftener than necessary.

In the last of the upper part of the climb the truck came along as steadily as in the lower grade. There had not been a dip or level spot for the nine miles from the bridge. The ability of the cooling system to keep the motor delivering its full power is the chief thing which Stoner believes allowed the climb to be made. The power was always there either for a pull forward or for the triple braking effect of the motor brake when backing down toward the jump-off to make a second start at a turn too sharp for the wheels to follow in a single advance.

The removal of the muffler and addition of a stock overload spring were the only preparations made for the trial trip and later haul with the 11-ton load. Stoner,

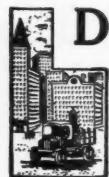


Views En Route the Nine-Mile Mountain Climb Up Mt. Wilson, With the 22,235 lb. Load of Structural Steel  
The view on the right shows one of the switchbacks where the road doubles back on itself and raises 40 feet while going around 60 yards

The CCJ leads in circulation, advertising and prestige

replying to an inquiry as to what he had learned by the trip, sums up the important points as a demonstration exceeding any yet achieved of the ability of driving mechanism, springs, axles, transmission gears and other parts to stand long continued stresses much greater than those they are likely to receive under ordinary circumstances; in other words a proof of reliability of the factors of safety employed in all parts. The economy of the truck is shown in the fuel consumption of  $16\frac{1}{2}$  gals. of gasoline and two-thirds of a gal. of oil.

### SAFETY DEVICE PREVENTS ELECTRICS FROM STARTING ACCIDENTALLY



**D**ESPITE the care exercised by trained drivers, the switch on an electric truck is occasionally thrown in while the controller is off the neutral point. This act has caused not only property damage, but frequently personal injuries, and occasionally death.

The fact that this accident hazard existed led the Eastman Kodak Co., which operates a fleet of electric trucks, to develop a safety device to prevent such an accident. The mechanical engineering department of the Kodak Co. has just completed the installation of the device on its trucks. With this mechanism it is absolutely impossible to close the main switch when the controller is off the neutral point. The device has not been patented, as the designers wished anyone caring to do so to take advantage of it, either in building new trucks, or in equipping those now in use.

The photograph shows one of the devices mounted in a box similar to a driver's seat in the rough. The photographs are taken from the front. The driver sits at the left side of the box, operating the control lever with his left hand. The rheostat selector shaft, to which the controller lever is attached, also carries a sector, which prevents the operator from engaging the switch except when the selector is at the neutral point. A lever has been

attached to the main switch, from which the handle has been removed. This lever has a pawl. There is a slot in the sector, through which the pawl on the lever actuating the switch must pass in order to close the switch. The sector is so located that when the switch is closed the rheostat selectors are all at the neutral point. As the pawl is held forward by a pressure spring, the switch lever can disengage the switch at any position of the selector.

### TURNS DOWN A TIRE IN LATHE TO REMOVE FLAT SPOT

An interesting operation to a truck tire was recently staged by the Portland, Ore., Railway & Light Co. A broad flat spot had been worn on the tread by an exceptionally bad skid of one of its trucks. As the tire was practically new, the company naturally had no desire to scrap it, and hit upon the happy expedient of paring off the rubber on an ordinary machine lathe, until an even circumference could be secured. One of the narrow strips turned off in this operation was 21 ft. long, proving very conclusively the extreme toughness of the rubber. The tire was a Goodyear.

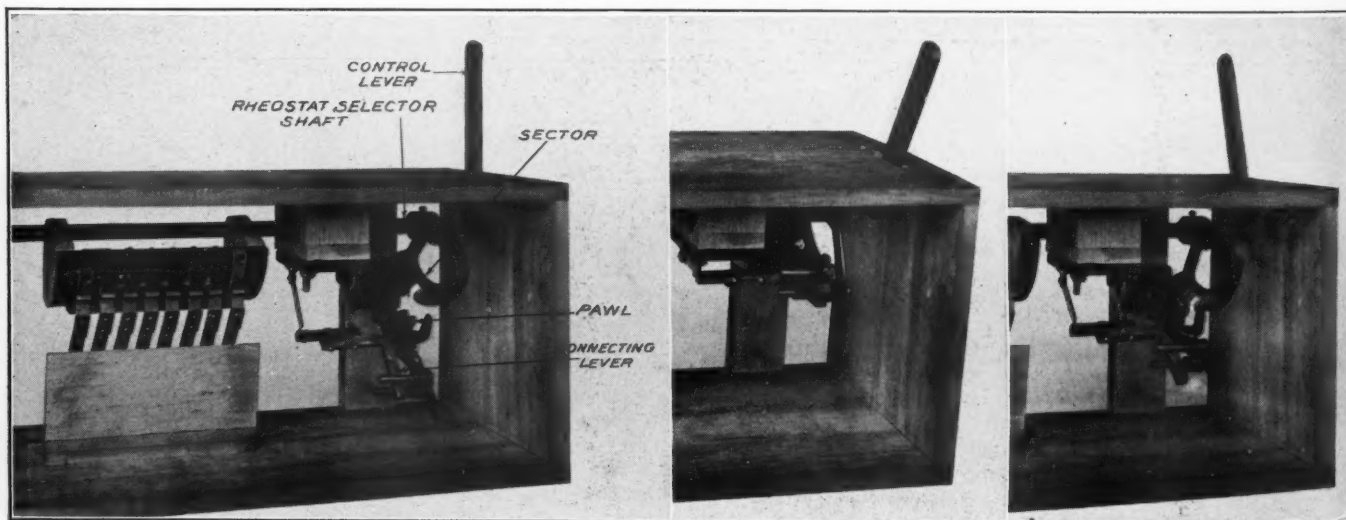
### WESTERNER BELIEVES DEALER SHOULD FINANCE HIS OWN SALES

Differing from a majority of the dealers in his locality, a very successful distributor of a high priced truck in the West, where time payments are a fixed feature of the business, says, "The dealer is the one who ought to carry the financial burden of his sales. Every dealer should be so fixed financially that he can carry the time payments on the trucks going into his territory through his sales office, and carry a full stock from which to make deliveries. My business has been better because I never asked my factory to unload a car for me. The manufacturer is 3000 miles away and all the stuff comes draft attached to bill of lading. When a dealer pays that draft the trucks are his and he has got to sell them. That is what is good for his business and it is good for the manufacturer's business, too, and because a dealer can stand behind his business to this extent must make good to his customers it is good for them also. Some dealers want too much and hang on to the manufacturers and worry them for it. That is what makes some manufacturers act so crabby at times."



**A Locomobile Truck Doing a Little Heavy Work**

When it was found necessary to move the building illustrated above, a Locomobile worm-drive truck was put on the job. The truck was ballasted with iron bars and performed the feat without any difficulty.



**Three Views of the Safety Device for Electrics**

From left to right: main switch open and pawl disengaged; main switch closed, switch arm engaged with sector; main switch open, switch arm partly disengaged, sector not at neutral position

The CCJ brings greatest returns to advertisers because of largest circulation among quantity buyers



## The Metz Company Enters Delivery Car Field

### Offers Three Special Types of Commercial Delivery Cars of Eight Hundred Pounds Capacity

**T**HE Metz Co., of Waltham, Mass., well-known manufacturers of light roadsters and touring cars, has entered the light delivery field, having announced five models of commercial delivery cars. These various bodies are all mounted on the regular Metz pleasure car chasses and have capacity of 800 lbs. The Metz Co. make their own engines, other chassis units being the friction drive transmission and rear axle, drive being single enclosed chain.

#### Engine

A four-cylinder engine is used, cylinders "L"-head, cast in block. Bore is  $3\frac{7}{8}$  in., stroke 4 in. S.A.E. rating 24.14 h.p. Pistons are ground and fitted with four ground piston rings. Piston displacement is 188.7 cu. in. Crankshaft has three main bearings. Valves are interchangeable and mechanically operated. Lubrication is by constant level splash system. Ignition is by high tension system. Carburetor is an A. W. T. float feed.

#### General Details

Starting and lighting is by Gray and Davis system. Wheelbase is 108 in., tread 56 in. Wheels are standard artillery type. Tires are Goodrich 30x3½ in. Transmission is by fiber grip gearless transmission, including a special alloy driving plate and fiber ring driven wheel. Drive is left side, center control. Two sets of brakes are provided and in addition the reverse may be used. Equip-

ment includes built in gasoline gage, wind-shield, speedometer, horn, jack tools, etc.

#### Models

Model A is a 25 h.p. car with express body, equipped with Prest-O-Lite tank, two gas head lights, two side oil lights and one tail oil lamp. Measurements of body: 54 in. long inside, 41½ in. wide, sides 10 in. deep, with 6-in. fenders. Price, \$475.



**Metz Model C, Express Body**

This express body with top and curtains, gas and oil lamp equipment sells for \$525

Model B, same as Model A, except that it is equipped with Gray & Davis electric starter and electric lights. Price, \$525.

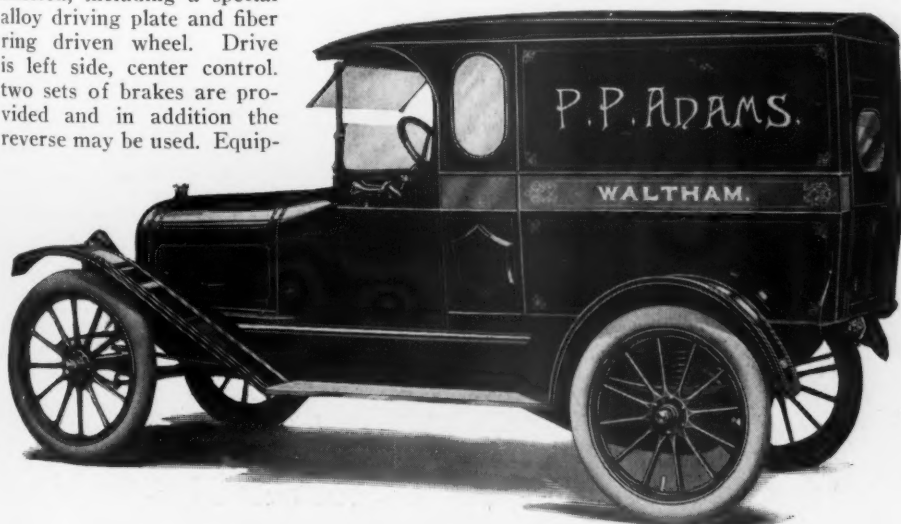
Model C is a 25 h.p. car with express body, top and side curtains. Prest-O-Lite

tank, two gas head lights, two side oil lamps and one tail oil lamp. Curtains are arranged to roll up in fine weather, and can be let down to completely enclose body of car in stormy weather. Measurements

of body, same as above, and 49 in. from floor to top in center. Price, \$525.

Model D, same as Model C, except that it is equipped with Gray & Davis electric starter and electric lights. Measurements same as quoted above. Price, \$575.

Model E is a 25 h.p. commercial delivery car, with entirely enclosed paneled body, equipment including Gray & Davis electric starter and electric lights. Measurements of body, 54 in. long inside, 38 in. at bottom tapering up to 42 in., and 49 in. from floor to ceiling in center. Door is 26x39 in. Price, \$600.



**Metz Model E, Commercial Delivery Car**

This entirely closed body model has full electrical equipment and sells for \$600. Body is 54 in. long, and tapers from 38 in. to 42 in. wide.

#### ABBOTT-DOWNING MAKING TRUCKS

Abbott-Downing Co., Concord, N. H., for more than fifty years maker of wagons and carriages, has entered the motor truck industry, and will make trucks of 3-ton capacity and upwards.

**Cadillac Auto Truck Co.**, Cadillac, Mich., is about to place on the market a new ¾-ton model truck. This will be described in detail in an early issue.

The CCJ has most readers because it gives most information

# Diamond T Has Four Models and Will Add Another

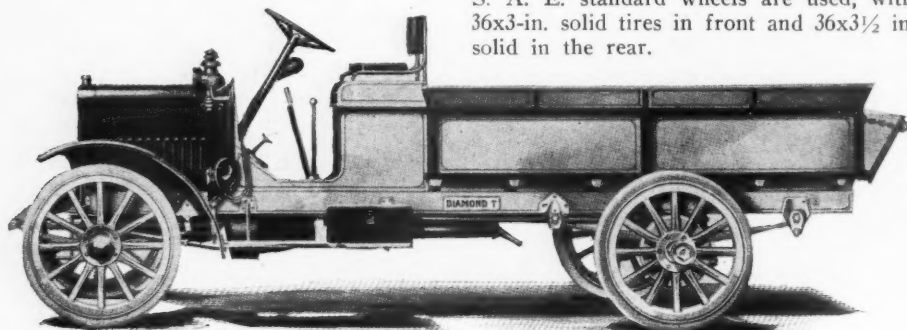
By CHARLES P. ROOT

**W**ITH a line now consisting of four models of trucks and additions to the factory which will give more than double the capacity as a manufacturing plant, the Diamond T Motor Car Co., of Chicago, Ill., is bringing out another model, a  $\frac{3}{4}$ -ton truck, the chassis of which will list at \$1175. This will give the Diamond T people a line of five sizes of trucks,  $\frac{3}{4}$ , 1,  $1\frac{1}{2}$ , 2 and 3 ton.



53-in. semi-elliptic rear springs  $2\frac{1}{2}$  in. wide, all made of chrome vanadium and steel spring bolts fitted with grease cups. The frame is sufficiently long to give a wheelbase of 126 in., while the tread is standard.

The front axle is a Timken-Detroit of I-beam section and with Timken hubs and bearings, while the rear axle is a Timken-David Brown, full floating and with worm gear drive, having a locking device for the bearing adjustment and a gear ratio of 6:1. S. A. E. standard wheels are used, with  $36 \times 3$ -in. solid tires in front and  $36 \times 3\frac{1}{2}$  in. solid in the rear.



**Diamond T Fifteen Hundred Pound Truck**

This is known as Model J-A. It has 126 in. wheelbase, Continental engine, Brown-Lipe clutch and transmission, Timken-Detroit axles, and is priced at \$1175

Where heretofore the factory has embraced a portion of the building at the corner of Superior and Townsend Streets, the business has grown to such an extent that it became necessary to enlarge, and the entire building has been secured and has been fitted out especially for truck making. It is a one-story affair, with a two-story office part, high and light roof and light on all sides, two of which are on streets. The building has been remodeled, a new steam plant installed, the offices refitted and the building arranged for the work of manufacture and service as well.

The north two-thirds will be devoted to the assembling plant, the east end to the stock room and the south side, along Superior Street, will be the service and repair departments.

## The Three-Quarter Ton Model

The new model is of  $\frac{3}{4}$ -ton capacity and while it will have all the earmarks of a Diamond T it will embrace a number of features that are not to be found in the other models produced by this company. It is designed as a popular priced truck, with considerable speed and will list at \$1175 for the chassis. The chassis will weigh 3000 lbs., and while it is designed for a  $\frac{3}{4}$ -ton load it is made with the view that it will be loaded with at least a full ton and has been designed with a factor of safety to take care of this overload.

## Frame and Springs

The frame has a vertical section of  $4\frac{7}{8}$  in., with a 2-in. flange in front,  $3\frac{1}{2}$  in. at the widest part and tapering to  $2\frac{1}{4}$  in. at the rear end. This is carried on 38-in. semi-elliptic front springs  $2\frac{1}{4}$  in. wide and

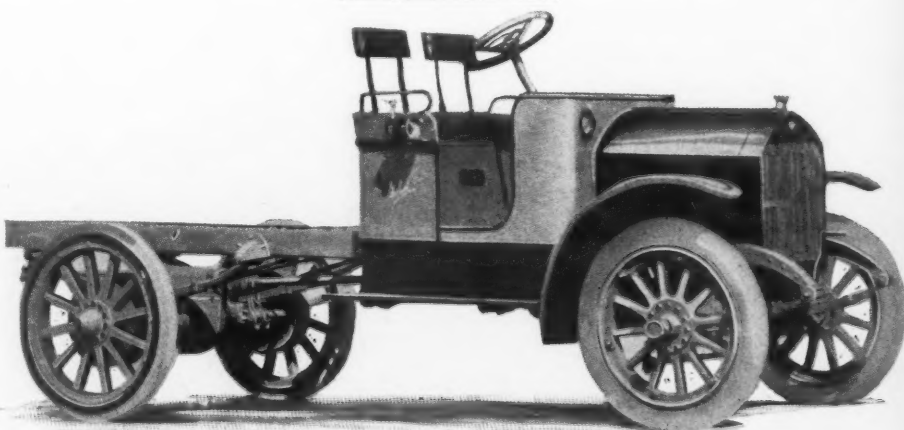
housing being integral with the crankcase and all bolted to the engine crankcase. The three speed gear set parts are mounted on Timken bearings, while the clutch is of the dry plate variety Raybestos surface against steel plates. The power is carried from the transmission through double universal joints of the Spicer make interposed between the transmission case and the rear axle, with a slip joint to take care of spring elongation due to spring action.

Heretofore the Diamond T trucks have resorted to centrifugal pump for water circulation, but in this new car thermo-syphon cooling will be employed, the radiator being a little different in design and of the square tube honeycomb type. The truck will not be fitted with a starter and ignition is by means of a Bosch NU 4 magneto, with fixed spark.

Another change in Diamond T practice is in the location of the steering wheel and the control levers. Heretofore the former has been on the right side, whereas in the new model it will be on the left, with the gear shift and emergency brake levers located at the driver's right, or in the center. The spark being fixed there are no levers for the operator other than the brake and gear shift, for the throttle is operated by the foot through the accelerator. As in all the other models a Rayfield carburetor is used, but in this case it is 1 in. as against  $1\frac{1}{4}$  in. on the larger models.

It is designed to fit a Pierce governor when as an extra and this also applied to in the matter of pneumatic tires, demountable rims, lazy back seats and combination electric and kerosene oil lamps; otherwise the equipment comprises front fenders, running boards, tools, oil lamps and horn.

It is designed to restrict the speed of this model to a maximum of about 20 m.p.h., although it is stated that it can be run close to 25 m.p.h.



**Garford Model 75, One-Ton Worm-Drive Truck Chassis**

This three-quarter view shows the one-ton Garford model, made by the Garford Motor Truck Company, of Lima, Ohio. The engine specifications for this model are: 4 cylinder, L-head,  $3\frac{1}{2} \times 5\frac{1}{8}$ ", three-point suspension, rated at 19.6 h.p. Wheelbase is 120"; tires are  $34 \times 4\frac{1}{2}$ " pneumatic, front;  $36 \times 4$ " solid, rear. Other specifications are the same as for the one and a half ton model described in our June, 1915, issue, page 19. Chassis price is \$1450.

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Removable  
Rim  
Always  
Works**

**Proved by Many  
Years of  
Success in  
Hardest  
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## **A Firestone Factor of Efficient Truck Tire Service**

which has proved its success wherever trucks are operated is the S.A.E. Removable Rim Equipment. Years of the hardest use in many varied lines have established the Firestone as standard equipment, always dependable.

With this equipment any driver can change tires in a few minutes, without removing the wheel from the truck. It makes a great addition to the actual running time of truck service.

Fifteen years of tire development by the most highly specialized experts ever assembled in one institution, have wrought the Firestone "Most Miles per Dollar" design and quality—toughness

that gives longest wear combined with resiliency that protects the truck mechanism. This accounts for the fact that by far more Firestone Truck tires are in use than of any other one make.

There is a Firestone Tire for every demand and a Firestone Service Station in every trucking center with specialists to give you the benefit of their experience and counsel. Call the Firestone headquarters nearest you for details and low prices.

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# **Firestone**

## **TRUCK TIRES**

## The Stewart One Thousand Pound Truck: It Sells for \$695

By GEORGE W. GRUPP



**W**ITH this announcement by the Stewart Motor Car Corp., of Buffalo, N. Y., another addition has been added to the family of 1000-lb. trucks.

Throughout the designing of this truck, which will be known as Model 5, the chief aim of the designers has been to give to the public a truck which is well proportioned and one which will stand strenuous service. The chassis sells for \$695. The prices of the bodies range from \$45 to \$150. All prices quoted are Buffalo f.o.b.

drag link to absorb the shocks. The change gear and brake levers are located in the center of the driving platform.

### Axles, Brakes, Frame and Springs

The front axles are tubular and have large spindles, while the rear axles are of the Celfor internal gear type.

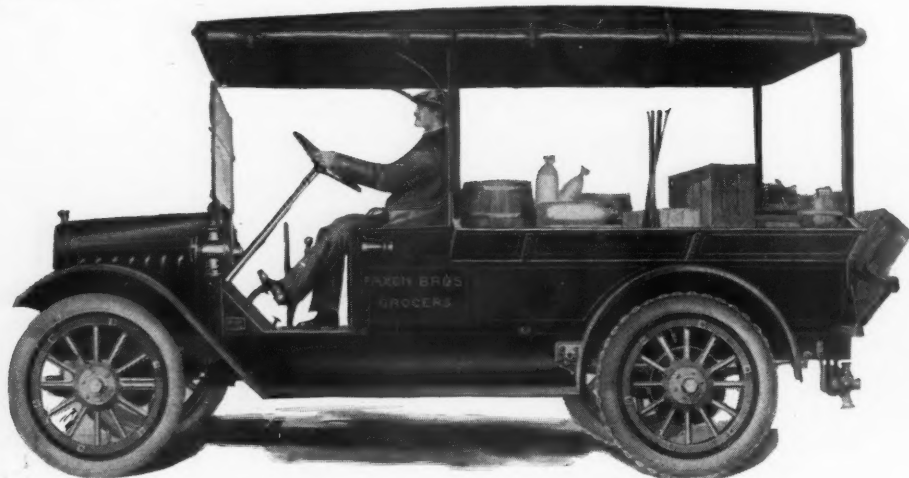
All brakes are controlled by both foot and hand. They operate on the rear wheel drums (diameter 14 in.), which are made of pressed steel. The service brake is equipped with an equalizer.

on roller bearings. The front wheel has twelve 1¼-in. spokes, while the rear wheel has fourteen 1½-in. spokes.

Ample sized pneumatic tires (32x4 in.) are used. The rear tires are non-skid. All rims are the Firestone steel demountables.

The wheelbase is 106 in., while the road clearance is 10 in. The gasoline tank, which is located under the driver's seat, has a capacity of 10 gals. There is 6 ft. of loading space back of the driver's seat. The amount of overhang back of the axle is 24 in. and the height of the loading platform is 24 in. The chassis weighs 1800 lbs.

The equipment consists of a glass front, a mechanical horn, two oil side lamps, one oil tail lamp, an extra rim, tire irons, a tool kit, a jack and a tire pump.



**The Stewart Model 5, One Thousand Pound Model**

This is the new model produced by the Stewart Motor Corporation. It has four-cylinder engine, 3 x 4 in.; three-speed transmission; disc clutch; Celfor rear axle and 32 x 4 in. tires

The engine is 25 h.p., four-cylinder, cast in block, has a 3-in. bore and 4-in. stroke, three-point suspension, and has a maximum speed of 28 m.p.h. Plain bearings are used throughout the crankshaft. The splash and force feed system of lubrication is used. It has a vertical type of carburetor which is controlled by a foot accelerator. The magneto is a Bosch high tension with a fixed spark. The cooling is done by the thermo-syphon system. A honeycombed radiator is used, and the steel bladed fan runs on ball bearings.

### Transmission, Clutch and Steering Wheel

The transmission is of the unit power plant type, three speeds forward and one reverse. This is bolted direct to the engine. Ball bearings are used throughout. The transmission gear ratios are: High, 1:1; intermediate, 1.7:1; low, 3.2:1, and reverse, 3.2:1. The gear ratios from the engine to the rear wheel are: High, 6:1; intermediate, 10.2:1; low, 19.2:1, and reverse, 25.4:1. The tubular propeller shaft has two universal joints between the transmission and the rear axle. The direct drive is on high.

A multiple disc dry plate style of clutch is used. It is automatically adjusted. The surface material is Raybestos.

The steering wheel which is 16 in. in diameter is located on the left side. It is adjustable, irreversible, and has a spring

Pressed steel, channel section, 5/32 in. stock is the material used for the frames. The side members are 4 in. deep.

The springs, both front and rear, are semi-elliptic and are made of the best spring steel. The front springs are 34x2 in. and the rear springs are 46x2 in.

### Wheels, Tires and Equipment

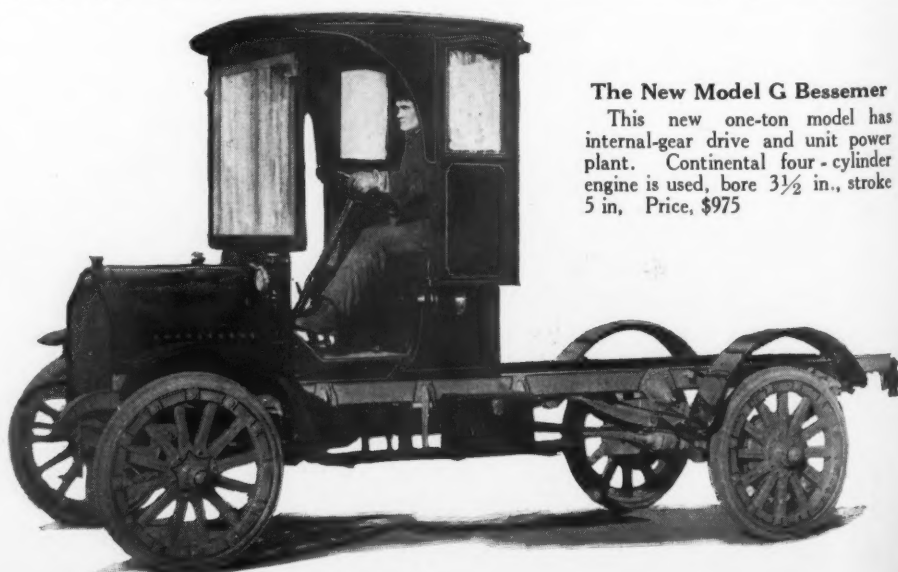
Both front and rear wheels are of the artillery type with square spokes, and run

## BESSEMER ANNOUNCES NEW ONE-TON INTERNAL-GEAR DRIVE TRUCK AT POPULAR PRICE

A new one-ton internal gear drive truck, fully up to the high standard of the Bessemer line, has been announced by the manufacturers, the Bessemer Motor Truck Co., of Grove City, Pa. The new car known as the "Model G," lists at \$975 for the chassis and seat. Bodies and top are extra. The Model G differs from the other Bessemer models in that a unit power plant is used, and in the final drive. In all other respects it resembles the larger trucks.

### Unit Power Plant

The engine is the Continental Model N, having four cylinders cast in block, L-head, a bore of 3½ in. and a stroke of 5 in. Lubrication is by combination force feed and splash system. Ignition is by Bosch high tension magneto, type NU4. Carburetor is Rayfield, 1 in., model LL2. The engine is water cooled having a cellular radiator of heavy construction and



**The New Model G Bessemer**

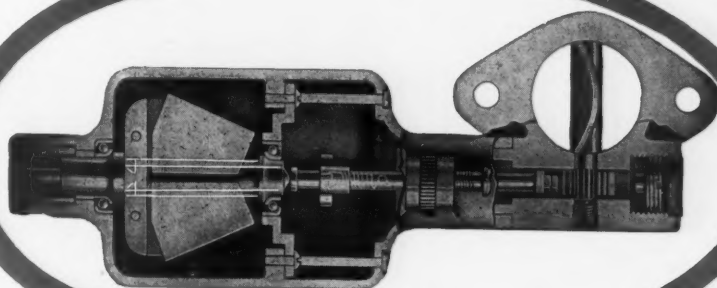
This new one-ton model has internal-gear drive and unit power plant. Continental four-cylinder engine is used, bore 3½ in., stroke 5 in. Price, \$975

# A Selling Asset

the presence of the

## Pierce Governor

is cited by truck makers as one of the compelling reasons why their product should be purchased.



This is but one of many such instances, for the leading truck makers have learned by experience that their trucks have greater efficiency and are more easily sold if one of the three Pierce Speed-Controlling Devices is incorporated in them.

If your trucks are not so equipped, you ought to investigate their merits. We can produce some mighty convincing evidence that will induce you to install one of these three Pierce Speed-Controlling Devices.



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Secure the early 1916 orders to be placed immediately by business firms in your territory for ACME 2-Ton Trucks.

The ACME has larger truck dimensions on 148-inch wheelbase—more power—better cent guaranteed overload capacity under normal conditions—extra spacious appearance—well balanced and artistic design—and fourteen proved units harmoniously combined by leading American manufacturers.

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Timken Worm Drive	Warner Clutch	Eiseman
Timken Front Axle	Warner Transmission	Rayfield
Timken Rear Axle	Detroit Springs	Gemmer
Smith Pressed Steel Frame	Pierce Governor	

In the ACME buyers get the benefit of the experience of thousands of truck users—save all experiment.

From starting crank to tail light there is not an experimental feature in the ACME—nothing but proved units.

**Clinch the Agency—GET IMMEDIATE TRUCK BUSINESS!**

Make the biggest, best class of truck buyers your boosters.

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Act quickly to get this early 1916 business in next 30 to 40 days. Send Coupon, for Agency Terms and Agreement—OR WIRE.

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**Watch for Announcement of 3 1/2-Ton Truck**

2-Ton ACME with Special Steel Body Chassis \$2,000. Equipped. Special Bodies Designed and Estimated. Use of 8 ft. Commercial Standard—higher suspension and other improvements give still greater dimensions than standard.

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40 Mitchell Street, Cadillac, Mich.  
I am interested in your 3 1/2-Ton Truck and your Agency offer for this territory.

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Firm Name \_\_\_\_\_  
Address \_\_\_\_\_  
Phone \_\_\_\_\_  
Please send me all the facts about the ACME 2-Ton Truck and your Agency offer for this territory.

**PIERCE GOVERNOR COMPANY**  
ANDERSON, INDIANA, U. S. A.

ample size. Water is circulated by the thermo-syphon system, and cooling is aided by a 16 in., four-blade fan, mounted on ball bearings. The clutch is of the multiple disc dry plate type, and the transmission of the selective sliding gear type, giving three speeds forward and one reverse. Clutch and transmission are manufactured by the Covert Motor Vehicle Co.

The propeller-shaft is Shelby seamless steel tubing,  $2\frac{1}{4}$  in. outside diameter, with  $3/16$ -in. walls, and is equipped with Hartford F-300 universal joints. The slip joint is carried at the forward end.

#### Axles and Springs

The front axle used in this model is an I-beam steel forging, of Sheldon manufacture. The rear axle is the well-known Torbenson internal gear. Two sets of brakes are used, both operating on the rear wheel drums. The brakes are  $15\frac{1}{2}$  in. in diameter, by  $2\frac{1}{2}$  in. in width. Springs are semi-elliptic,  $2\frac{1}{4} \times 40$  in. front and  $2\frac{1}{2} \times 46$  in. rear, made of Halcomb Silico Manganese steel. Drive is of the Hotchkiss type, and is naturally transmitted through the springs. The frame on this model, like all Bessemer trucks, is of pressed steel,  $4\frac{9}{16} \times 2\frac{1}{2} \times 3/16$  in. Wheelbase is 124 in. Wheel sizes are  $34 \times 3$  and  $3\frac{1}{2}$  in., and either solid or pneumatic tires can be furnished. The standard express body for this truck measures 9 ft. 3 in. long, 3 ft. 9 in. wide, with 12 in. side panels.

## New Service Model 120, One-Ton Worm-Drive Truck

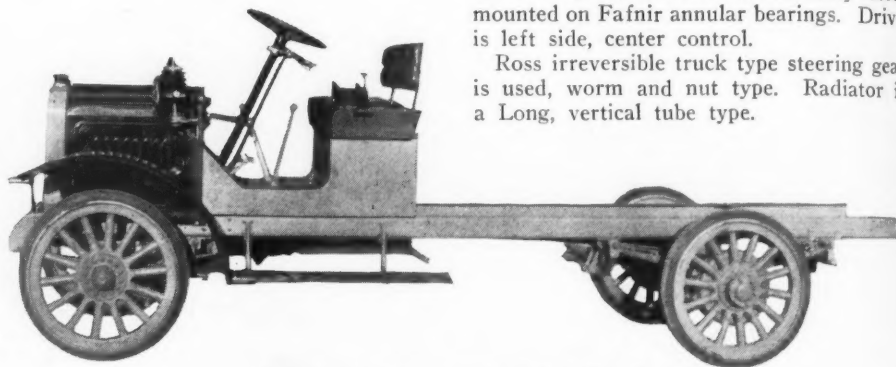


**A**NNOUNCEMENT of a new one-ton worm-drive truck has just recently been made by the Service Motor Truck Co., of Wabash, Ind. This new Model 120, as it is called, consists of standardized units as the other Service trucks do, which are made in the following capacities:  $1\frac{1}{2}$ , 2,  $3\frac{1}{2}$  and 5 ton. Price is \$1375 in lead, f.o.b. Wabash.

The engine in this is a Buda, four-cylinder, "L"-head type, cast in block, bore  $3\frac{1}{2}$  in., stroke  $5\frac{1}{8}$  in. Cooling is by Thermo-Syphon system, ignition by Bosch high tension magneto, and the carburetor is a Stromberg, with dash control and hot air connection.

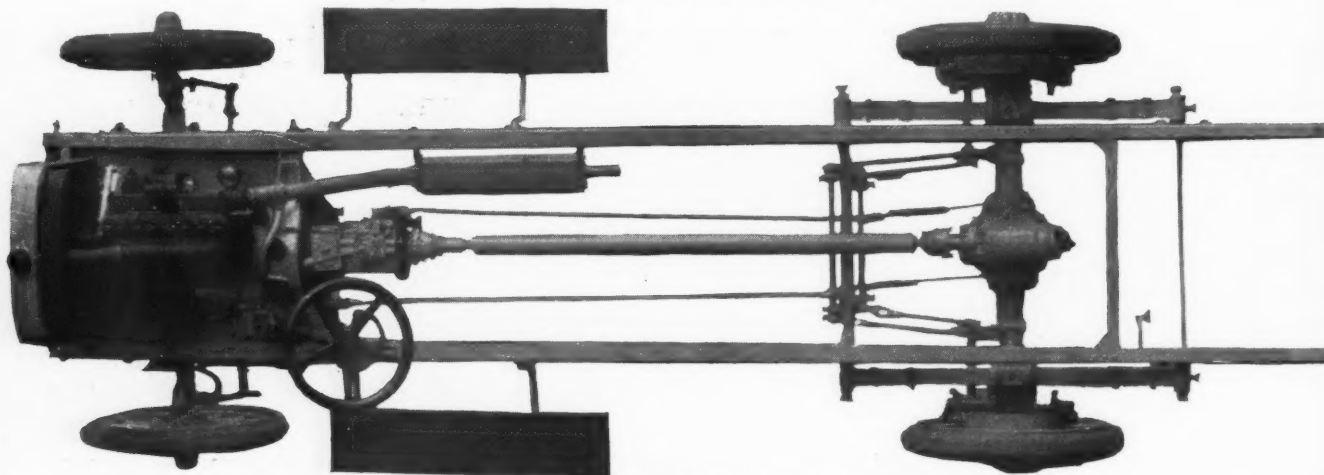
The clutch is dry plate type, Raybestos against steel. The transmission is selective type, three speeds forward and one reverse. Gears and shaft heat treated alloy steel mounted on Fafnir annular bearings. Drive is left side, center control.

Ross irreversible truck type steering gear is used, worm and nut type. Radiator is a Long, vertical tube type.



Side View of Service One-Ton Truck

This model is known as the Model 120 one-ton worm-drive chassis. Chassis weight is 3200 lbs. Tires are solid,  $34 \times 3$  in. on front, and  $34 \times 4$  in. on rear. Equipment includes three oil lamps, tools, jacks, runningboards, front fenders, driver's seat and cushion.



Top Plan View of Chassis of Service One-Ton Model

Engine, clutch, transmission, and accessories are mounted and assembled as unit, and carried on three-point suspension. Rear springs are on outside of frame and designed to be flat under load, giving easy riding and low loading space



Columbia Trailer, Model S, Price \$83

The Columbia Wagon Company, of Columbia, Pa., manufactures a complete line of automobile trailers and all kinds of commercial car bodies. The model S trailer is 8 ft. long,  $46\frac{1}{2}$  in. wide and  $16\frac{1}{2}$  in. high; slat or solid side board body, including flange boards, if desired. The wheels are fitted with 2 in. solid rubber tires, mounted on ball bearings. Capacity 1200 to 1500 pounds.

Frame is pressed steel channel section,  $4\frac{1}{2}$  in. deep, of  $\frac{1}{4}$  in. stock, flange varying from  $1\frac{3}{4}$  in. to  $3\frac{1}{2}$  in. Length back of driver's seat 9 ft., width is 34 in.

Front axle is Timken or Sheldon, drop-forged "I"-beam section alloy steel. Adjustable taper roller bearings in wheel hubs. Ring bolts, tie rod bolts, etc., extra large.

Rear axle is Timken-David Brown full floating or Sheldon worm drive with David Brown type worm.

Brakes are double internal expanding on rear wheel drums, which are 16 in. in diameter. Wheels are Indiana second growth hickory, with fourteen 2-in. spokes to each wheel. Drive is by tubular propeller shaft and Spicer universal joint. Tires are  $34 \times 3$  in. on front and  $34 \times 4$  in. on rear, solid in each case.